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**Announcement of
Opportunity**

**Next Generation Space
Telescope (NGST)**

Flight Investigations

Comments Due:

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ANNOUNCEMENT OF OPPORTUNITY FOR NEXT GENERATION SPACE TELESCOPE FLIGHT INVESTIGATIONS

1.0 Description of the Opportunity

1.1 Introduction

The National Aeronautics and Space Administration (NASA), Office of Space Science (OSS), announces the opportunity to conduct scientific investigations that utilize the Next Generation Space Telescope (NGST). In particular, through this Announcement of Opportunity (AO) NASA will accept proposals for scientific investigations that would:

- develop and use scientific instrumentation capable of achieving the imaging goals of NGST in the near infrared (NIR: defined as 0.6-5 μ m) wavelength regime (hereafter called NIRCam Principal Investigator [NIRCam PI] investigations); or
- participate in the development, integration, and test of the facility mid-infrared (MIR: defined as 5-28 μ m) instrument (MIRI) in addition to using data from the instrument (MIRI Science Lead investigations and MIRI Science Team Member investigations); or
- conduct interdisciplinary investigations using data taken by the reference observatory and reference instrument set as well as actively participate in NGST facility and telescope development (Facility Scientist investigations and Telescope Scientist investigations); or
- conduct interdisciplinary investigations using data taken by the reference observatory and reference instrument set and participate in the science oversight of the NGST development (Interdisciplinary Scientist [IDS] investigations).

The NGST will be developed in collaboration with the European Space Agency (ESA) and the Canadian Space Agency (CSA). Mission and project description documents that give additional information on the NGST science mission, and the NGST Program can be found in the NGST AO Library (see Appendix C)

Proposals submitted in response to this AO must be for investigations extending through all appropriate mission phases. For the purposes of this AO, mission phases are defined as follows: Phase A - concept study; Phase B - definition and preliminary design; Phase C - detailed design; Phase D - development (through launch and in-orbit checkout); and Phase E - mission operations and data analysis. Phase E is to include analysis and publication of Guaranteed Time Observation (GTO) data in the peer reviewed scientific literature as well as full implementation of an appropriate Education and Public Outreach (E/PO) program.

1.2 Proposal Evaluation and Selection Process

The selection process for investigations offering to develop flight instrumentation (NIRCam PI proposals) will be done in two stages. For the first stage NASA intends to select, in response to this AO, up to two proposals for 6 month Phase A concept studies. After an evaluation of the

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Phase A concept study reports, a single NIRCam investigation will be carried forward for implementation leading to flight. The selection process for all investigations other than NIRCam PI investigations will be done in a single stage through this AO. The proposal evaluation and selection process is described in section 5.

1.3 Proposal Opportunity Schedule

The schedule of events associated with this Announcement of Opportunity is given in Section 6.0.

1.4 NASA Resources Available for this AO

The NGST is cost constrained, and cost will be an important factor in the selection of scientific investigations. NASA currently has budgeted a maximum of \$(TBD)M, including reserves, through FY 2009 for the formulation (Phase A/B) and implementation (Phase C/D) activities, through delivery, launch, and orbital verification, for all investigations selected under this AO. The spending profiles available for the different classes of investigations are given in the document [*Cost Estimating Relationships and Guidelines*](#), which may be found in the NGST AO Library (see Appendix C).

The NGST Program is currently in Phase A and is in the OSS strategic plan to begin implementation in Fiscal Year 2004. It is the intent of NASA to launch the NGST in approximately December 2008 and to operate the mission for a minimum of five years with a goal of ten years. NASA's ability to carry out the program described in this AO is contingent upon NASA receiving the necessary appropriations and upon NASA receiving appropriate proposals in response to this AO. This AO does not constitute an obligation on the part of the Government to carry to completion efforts selected in response to this AO.

1.5 Relationship to Other Opportunities

This AO is the only one contemplated to solicit NGST NIRCam PI, MIRI Science Lead, MIRI Science Team Member, Facility Scientist, Telescope Scientist, and IDS proposals, all of which are due on the schedule given in Section 6.0. The ESA plans to select the science team for the instrument for which it is responsible, a NIR spectrograph (NIRSpec) in 2002. It is anticipated that the NIRSpec Science Team will include two US members. NASA intends to issue periodic announcements for NGST general observer (GO) proposals to be executed during Phase E, with the first announcement expected approximately one year before launch.

2.0 NGST BACKGROUND, OBJECTIVES, AND GOALS

2.1 Background

The NGST is a large aperture, infrared-optimized observatory designed to build upon the success of the Hubble Space Telescope (HST). The NGST will be a general observer facility capable of supporting a wide variety of astronomical investigations.

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In their 2001 report to the National Academy of Science (NAS), [*Astronomy and Astrophysics in the New Millennium*](#), the Astronomy and Astrophysics Survey Committee ranked the NGST as the top priority for space science investment for this decade.

The NASA Office of Space Science's most recent strategic plan, [*The Space Science Enterprise Strategic Plan*](#) (November 2000), presents goals and objectives for NASA's space science program, as well as the missions and programs to address these goals. In that plan, the NGST is recognized as a key part of the flight program for 2003 and beyond.

The April 2000 report, [*Roadmap for the Office of Space Science Origins Theme*](#), lays out the science and technology plans for the OSS Astronomical Search for Origins (ASO) science theme. The NGST is a critical element of this roadmap since it addresses nine of the sixteen science objectives and fosters large space optics technology development required for subsequent ASO missions.

URLs for these reports can be found in the AO Library (Appendix C).

NASA plans to have the Space Telescope Science Institute (STScI) be the Science and Operations Center (S&OC) for the NGST. The STScI will have day-to-day responsibility for science implementation and flight operations during the operation phase of NGST.

2.2 Science Objectives and Goals

The primary science goal of the NGST mission is to advance the understanding of the formation of the first stars and galaxies. To this end, the NGST will enable programs that study the luminosities, forms, and environments of galaxies back to the epoch of their formation and will investigate how the birth and aging of a galaxy influence the chemical composition available to stars, planets, and living organisms.

These science objectives of the NGST are outlined in the 1999 publication [*Next Generation Space Telescope Report*](#) (prepared for the Panel on Ultraviolet, Optical, and Infrared Astronomy from Space of the NAS Astronomy and Astrophysics Survey Committee: see the AO Library). Some of the major areas to be addressed by the NGST include, but are not limited to, the following topics:

- Detecting the earliest phases of star and galaxy formation, which requires superb NIR sensitivity (~4 nano-Janskys [point source sensitivity] from 0.6-5 microns);
- Resolving the first galactic substructures larger than individual star clusters, which requires HST-like resolution in the NIR;
- Detecting and diagnosing dust-enshrouded regions hiding massive star formation of active galactic nuclei during the epoch of greatest star formation to a minimum of $z \sim 2$, which requires MIR imaging and spectroscopy;
- Following the light curves of distant supernovae, which requires that the observatory be capable of continuously monitoring portions of the sky for several months;
- Characterizing the infall and outflow processes through which stars are built and their final masses determined, which requires MIR spectroscopy to diagnose the accretion

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shocks in protostellar systems and NIR imaging to reveal outflow shocks near their source; and

- Detecting and characterizing substellar objects, which requires MIR imaging and spectroscopy.

2.3 Reference Telescope and Instrument Complement

In order to give prospective proposers the fullest possible understanding of the NGST mission, NASA provides (i) a description of a reference NGST telescope in the NGST AO Library document [*Scientific Objectives and Capabilities of NGST*](#) and (ii) a candidate instrument suite based on the NGST Ad Hoc Science Working Group (ASWG) report for instrumentation (NGST AO Library document [*NGST Science Instrument Recommendations*](#)). Excerpts from these reports are given below, including a description of possible instruments. The instrument descriptions here are not intended to restrict the possible approaches. The list is simply a description of a sample instrument complement that can meet the mission science objectives.

At the time of the release of this AO, the interfaces and telescope and performance envelopes indicated here and in the NGST AO Library are preliminary. Any significant changes to these specifications will be treated as an AO modification and will be posted both on the NASA Research Opportunities Homepage (<http://research.hq.nasa.gov/>, select “Space Science”) and on the NGST AO Information Homepage (<http://www.ngst.nasa.gov/cgi-bin/doc?Id=871>). If an interface or resource is not addressed in NGST AO Library documentation (Appendix C), then the specifications in this AO will be used for evaluation purposes. Furthermore, proposers must be aware that, if they are selected, they may be asked to revise, at no additional cost to NASA, their proposed hardware as needed to meet slightly different telescope, spacecraft and mission requirements and specifications. Additional information on the spacecraft and mission architecture may be viewed at the NGST Program web site (<http://www.ngst.nasa.gov/>).

The recommended NGST science objectives can be achieved with the reference telescope with a large collecting area, large format, sensitive near-infrared detectors and large format, sensitive mid-infrared detectors. The Mid-infrared Partnership Planning (MIRP) group, appointed by NASA and ESA in Fall 2000, defined the science objectives and technical outlines of a conceptual MIRI. This group also identified the broad area of instrument development to be undertaken by NASA and ESA respectively. At the recommendation of the MIRP, NASA and ESA appointed a Mid-infrared Steering Committee (MISC) in February 2001. The charter of the MISC was to prepare functional requirements for the MIRI and a design concept. The findings of the MIRP and MISC are contained in the [*MISC MIRI Recommendations*](#) in the AO library. The NASA sponsored groups (ASWG, MISC) have suggested a reference instrument complement to satisfy NGST objectives consisting of:

- (1) NIR Imaging Camera [NIRCam] having ~16 square arcminutes field of view and spectral resolution / $R \sim 100$; of view and $R \sim 1000$ over 1-5 μm , $R \sim 100$ over 0.6-5 μm ; and
- (2) Multi-object spectrograph [NIRSpec] having ~9 square arcminutes field of view and $R \sim 1000$ over 1-5 μm , $R \sim 100$ over 0.6-5 μm ; and

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- (3) MIR instrument [MIRI] capable of both imaging and spectroscopy having ~ 2 square arcminutes imaging field of view and $R \sim 1500$ spectroscopy over 5-28 μ m.

Further details of the reference telescope and reference instrument complement can be found in the NGST AO Library (Appendix C).

Proposers should expect changes to the NGST program since it is currently in the Phase A portion of its development. Proposers should expect that evolution will occur in response to changes in the fiscal climate, technology developments, and personnel.

2.4 Reference Science Management Philosophy

In order to maximize the scientific capabilities of the NGST NASA has entered partnerships with ESA and CSA in which, for a guaranteed fraction of guest observing time [ESA: 15%, CSA: 5%], these other space agencies will contribute approximately \$200M and \$50M [FY96] (respectively) worth of goods and services. These partnership agreements contain the following elements relevant to this AO:

- NASA and CSA will partner on the development of the NIRCам, with CSA providing \$20M of its development costs;
- ESA will be responsible for the development and delivery of the NIR spectrograph;
- NASA and ESA (through special contributions from its Member States) will contribute approximately 50% each towards the development of the MIRI, with a Canadian contribution TBD;
- NASA will have the leadership responsibility for the MIRI. NASA will select a U.S. Science Lead (solicited in this AO). The responsibility for delivering the instrument to the NGST Program will be allocated to a NASA Center.

The NIRCам PI, MIRI Science Lead, Telescope Scientist, Facility Scientist, and Interdisciplinary Scientists will become members of the NGST Science Working Group (SWG). The SWG will also include ESA's designated lead scientists for the NIRSpec and MIRI and ex-officio members from the project and program offices of the participant organizations (NASA, ESA, CSA) and STScI. The charter for the SWG is contained in the NGST AO Library. NASA may elect to augment the SWG membership to meet changing needs of the NGST Program as it evolves. The SWG will work in collaboration with the STScI, NGST Program, NASA Headquarters, and the astronomical community to provide coherent scientific leadership during the formulation, design, construction, launch, and early scientific operation of the NGST. During these phases, the SWG will be a liaison to the astronomy community and will assist NASA in the dissemination of information about NGST.

NASA and ESA will manage the MIRI development jointly. The responsibility for integration and test, and delivery of the instrument to the NGST Program Office lies with the NASA Center selected by the OSS for this purpose. The NASA Center will assign a Instrument Manager who will have the overall responsibility for instrument development and a Instrument Scientist who will exercise day-to-day scientific direction during instrument design and development. The primary scientific guidance to the MIRI development will be provided through the MIRI Science

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Team (MST), which will consist of four U.S. scientists and the MIRI Science Lead, and four European scientists appointed by ESA. The NASA Center Instrument Scientist and his/her counterpart at ESA will be members of the MST.

The roles for each of the investigators solicited in the AO are described in Section 3.7.

3.0 PROGRAM CONSTRAINTS, REQUIREMENTS AND GUIDELINES

3.1 General Program Constraints and Guidelines

Every organization submitting a proposal in response to this AO must designate a single **Principal Investigator** (PI) who will be responsible for the quality and direction of the entire proposed investigation and for the use of all awarded funds. Note that NASA does not accept the designation of a “Co-Principal Investigator;” there must be only one PI who is solely responsible for an investigation.

NIRCam PI proposals should identify only the most critically important personnel to aid in the execution of their investigations. Should such personnel be required, **Co-Investigators** (Co-I’s) may be identified who are critical for the successful completion of an investigation through the contribution of unique expertise and/or capabilities, and who serve under the direction of the PI whether or not they receive compensation directly under the award. A Co-I must have a well-defined role in the investigation that is explicitly defined in the management section of the proposal and a record of experience in the relevant fields (see Section D.2.d of Appendix B). For all proposals submitted in response to this AO, evidence of the commitment of a Co-I to participate in the proposed investigation is required by way of a brief letter from him/her even if he/she is from the same institution as the PI. In addition, Co-I’s must indicate the approximate amount of time they intend to devote to this effort. Since Co-I’s are critical for the successful completion of the investigation, funding for each Co-I must be explicitly accounted for, either within the NASA provided funding for the investigation or as a contribution.

NIRCam PI proposals may also identify as **collaborators** individuals who are less critical to the overall proposal than a Co-I but who are committed to provide a focused although unfunded contribution to a specific task. As for Co-I’s noted above, proposals submitted in response to this AO must include a brief letter of commitment from each collaborator that describes his/her specific, intended contribution to the investigation. NASA will consider NIRCam PI proposals that offer instruments with sensitivity only over the wavelength range cited in section 2.3.

Independent MIR instrument designs are not solicited by this AO, nor should a MIR capability (sensitivity beyond 6 microns) be included in a NIRCam PI investigation proposal. The MIR instrument will be considered government furnished equipment (GFE) for the purpose of the MIRI Science Lead and Team Member contracts. The ESA will be responsible for ensuring the quality and timely delivery of the European contribution to the MIRI. The designated NASA Center will be responsible for accepting and verifying the quality of the European contribution to the MIRI. The designated NASA Center will work closely with the MIRI Science Lead and the MST to ensure that the agreed performance criteria have been met.

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For proposals offering investigations to be performed as either the MIRI Science Lead or a MIRI Science Team Member, the PI is the only person the proposal may offer as an investigator. While the PI's of MIRI Science Lead and Science Team Member investigations may propose collaborators and additional staff to help them fulfill their responsibilities in performing the investigation, Co-Investigators are not allowed on MIRI Science Lead or MIRI Science Team proposals..

Proposals for Facility Scientist (FS), Telescope Scientist (TS), and Interdisciplinary Scientist (IDS) positions may include collaborators, but not Co-Investigators.

In support of these proposed investigations, but as a secondary emphasis, the proposed research may include theoretical research, numerical modeling, use of existing data from ground-based or suborbital observations, and laboratory astrophysics measurements. In addition, NASA will consider requests for support for new ground-based observations provided that the requests are clearly described, the observations are important to the success of the proposed effort, and their expense (including salary, travel, etc.) constitutes no more than 10 percent of the proposal's total budget.

For all types of proposals, additional guidelines can be found in Appendix B.

3.2 NGST Program Teaming Guidelines

The NGST Program is managed by the Goddard Space Flight Center (GSFC) and is organized into several Projects (see the [NGST Program Organization Chart](#) in the NGST AO Library). Each project focuses on a major element of the observatory and is comprised of scientific, technical, and management personnel. Successful proposers to this AO will have substantial working interactions across the NGST Program as a whole.

Successful proposers for NIRCам PI, MIRI Science Lead, TS, FS, and IDS investigations will become full members of NGST Science Working Group (SWG). Funding for all investigation will be through the NGST Program.

NASA and the Canadian Space Agency have agreed to collaborate in the construction of the NIRCам as described in section 3.3.

NASA and ESA have agreed that the near-infrared multi-object spectrometer (NIRSpec) will be built by ESA and furnished to NASA. This AO does not solicit proposals for the design, development, and delivery of such an instrument. The science capability of the NIRSpec is described in the document [Scientific Objectives and Capabilities of NGST](#) in the NGST AO Library, and science investigations may be proposed which use this instrument.

NASA and ESA will jointly manage MIRI development as described in section 2.4. This AO does not solicit proposals for the design, development, and delivery of such an instrument. However, the science capability of the MIRI is described in the document [Scientific Objectives and Capabilities of NGST](#) and [MISC MIRI Recommendations](#) in the NGST AO Library, and science investigations may be proposed which use this instrument.

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Personnel from the NGST Science and Operations Center (S&OC) will support instrument development during all mission phases to ensure that each instrument's operation and calibration plans achieve high science return at a reasonable cost. Early and continual interaction between instrument developers and the S&OC will provide a mechanism for S&OC personnel to develop expertise with the proposed instrument and to aid in the development of the NGST Ground System. Once an instrument development team (*e.g.*, NIRCam, MIRI, NIRSpec) is selected, the S&OC will formally assign a scientist to each team. This scientist will become the lead technical expert for the S&OC on each instrument, and will support the instrument development team in producing designs, by performing analysis, and by supporting testing as assigned by the instrument PI. The S&OC is responsible for the operational calibration plan for the science instruments. The S&OC will develop this plan with the concurrence of the science instrument development teams. There will be only one version of the calibration software for an instrument, therefore the S&OC and instrument teams will collaborate and agree upon who will develop what portions of this software. The S&OC will develop and help operate an integration and test (I&T) version of the ground system for the flight instrumentation. This ground system will be the sole system used for testing and validation phases of instrument development. The document [NGST Instrument Development Team and Science and Operations Center Roles and Responsibilities](#) in the NGST AO Library describes the plans for interaction between instrument PI's and the S&OC

3.3 Canadian Participation in NIRCam Scientific Investigations

NASA and the Canadian Space Agency have agreed to collaborate in the construction of the NIRCam. As part of this agreement, CSA will provide contributions valued up to approximately \$20M (US, FY96). NIRCam PI's are strongly encouraged to work with Canadian industry and include Canadian Co-Investigators in order to identify benefits to NGST in terms of enhanced science capability, cost savings, or risk reduction that are enabled by these CSA contributions. Offerors are encouraged to work directly with Canadian industry to identify and cost potential contributions. However, Canadian industry shall not enter into exclusive relationships with any offeror or members of an offeror's team. Canadian vendors will ultimately be selected by a CSA procurement process after and independent of this AO selection. NIRCam PI proposals must include a clear and specific descscope path in instrument design and identify the corresponding impact on the science objectives such that the proposed investigation can be achieved within the NASA cost cap for NIRCam in the event that the proposed CSA contribution does not materialize during the Phase A study. In such an eventuality, the PI will have to offer, for evaluation at the end of phase A, a design following this descscope plan.

Reports and information on Canadian capabilities suitable for NIRCam have been made available by CSA; these documents may be found in the NGST AO Library (see [Canadian Capabilities Report](#)). These reports include information on development work on NIRCam contracted by CSA and on studies done through the Herzberg Institute for Astrophysics, Victoria. During proposal preparation, contacts may be made with Canadian companies to discuss hardware contributions, including costs and schedules. No contracts may be made with Canadian companies during proposal preparation. During the evaluation process discussed in Section 5.2, CSA will provide advice on the proposed Canadian hardware contributions and costing. The

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final contract for Canadian hardware and any associated software will be let by CSA after down selection with all appropriate involvement of the selected NIRCam PI. The CSA will be responsible for accepting and ensuring the quality and delivery of its contracted items, and will work with the NIRCam PI and the NGST Program to ensure that the agreed performance criteria have been met. The Canadian contribution will be considered NASA GFE for the purposes of the NIRCam PI contract, and NASA will take appropriate action in the event of failure of CSA to complete its agreed work.

Proposal teams for the NIRCam are strongly encouraged to include qualified Canadian scientists. NIRCam proposal teams may include a maximum of 2 Canadian scientists. However, Canadian scientists are not permitted to enter into exclusive agreements with any US team prior to the selection of the NIRCam Phase A studies. After down selection to a single NIRCam investigation, CSA will negotiate with NASA and the winning NIRCam PI for the inclusion of additional Canadian scientists to the team. CSA will support up to 4 such Co-I's for the selected NIRCam team.

3.4 NIRCam Observatory Level Functions

The NIRCam will also be used by the NGST observatory system for image-based wavefront sensing and control (WFS&C) operations that optimize the image quality by adjusting the primary mirror figure. Responsibility for WFS&C lies with the NGST prime contractor. The NIRCam team will work with NASA and the prime contractor to assure that the NIRCam Phase A study instrument supports this function. Additional technical information and WFS&C requirements are given in the [NGST Level 2 Requirements Document](#) and the [NIRCam Interface Requirements Document](#) found in the AO Library.

A separate instrument will provide NGST observatory guiding functions. The NIRCam will not be required to support observatory level guiding requirements.

3.5 Integrated Science Instrument Module Provided Services

The NGST science instruments will be housed within the Integrated Science Instrument Module (ISIM) that will provide common services for all instruments. The ISIM is a distributed subsystem consisting of a cryogenic instrument module integrated with the Optical Telescope Element (OTE) and science processors, software and other electronics located in the Spacecraft Support Module. The ISIM provides structure, environment and data handling for several modular science instruments and potentially for components of the optical telescope element optics train. A list of ISIM provided hardware and software is given in the AO Library document [ISIM Provided Services](#). The AO Library also contains a draft version of the [Instrument Deliverable Documents List](#). Proposals for developing flight instrumentation must follow the guidelines for interfacing with the ISIM as described in the [NIRCam Interface Requirements Document](#) found in the NGST AO Library.

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3.6 NIR Detector Procurement

NASA is currently funding development of two competing detector technologies (InSb and HgCdTe) that show promise for meeting the NGST detector requirements (see the [Technology Development Specifications for NGST Detectors](#) in the NGST AO Library). For the purpose of this AO, NIRCам PI proposals should assume that detectors with the capabilities described in that document will be provided as GFE at no cost to the proposing team. The final detector downselect will be conducted during Phase B of the NGST Program when the program team (prime contractor, instrument teams, STScI, and the GSFC program office) is fully formed. NASA intends to issue a Request for Proposals for NIR flight detectors during Jan 2003. The NIRCам PI or the PI's designated team member detector specialist, will participate in the selection process for the flight detectors. It is expected that a single detector type will be selected for use in both the NIRCам and NIRSpec.

3.7 Proposal Classes

3.7.1 General Considerations

The following sections discuss the duties and roles for each of the classes of investigations that this AO solicits. Note that the same person may submit proposals for more than one of these classes, but that each proposal must be complete in itself. An investigator will be offered selection for only one of the classes at NASA's discretion; *i.e.*, a proposer will not be offered selection for more than one of these classes. It is recognized that the same person may appear on more than one proposal in any capacity (*e.g.*, PI, Co-I, collaborator). NASA will use the information provided in the proposals to evaluate an individual's ability to fulfill his/her responsibilities to multiple proposed investigations. At NASA's discretion, only one proposal requiring the participation of an over committed individual will be offered selection, *i.e.*, the dependence on a critical co-investigator whose presence is required for a more highly rated investigation may be sufficient justification for non-selection. Table 3-1 outlines important aspects for each of the proposal classes.

Since the NIRCам PI, MIRI Science Lead, Telescope Scientist, Facility Scientist and Interdisciplinary Scientist will be full members of the NGST Science Working Group (SWG), proposals for these classes of investigations must contain a budget both for time and funds to attend four SWG meetings annually. The MIRI Science Lead and MIRI Team Member proposals should budget time and funds to attend four MST meetings annually, the location of which will be decided by the MIRI Science Lead.

3.7.2 NIRCам Principal Investigator Investigations

The NIRCам PI will ultimately be responsible for the design, development and delivery of a fully flight qualified instrument to GSFC for insertion into the ISIM. The NIRCам PI (apart from carrying out the proposed scientific investigation) will be responsible for the calibration through the commissioning phase of his/her instrument (see Table 3-1). Given proposals of sufficient merit, NASA intends to select two NIRCам PI investigations that accomplish the NIR Camera science objectives for a 6-month NIRCам Phase A concept study, following which a

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down selection to a single NIRCam PI investigation will be made. The PI of the down selected investigation will be a full member of the NGST SWG.

The NIRCam PI will work with the NGST ISIM Project systems engineering team during the ISIM detailed design phase to maximize the effectiveness of engineering trades and to ensure the proposed science remains feasible. The NIRCam science instrument development team (IDT) will participate in GSFC flight software development, participate in STScI ground system software development, support integration and test efforts for the ISIM, support GSFC in acquiring and testing NIR detectors, develop instrument specific flight software, and develop documentation for the instrument. Further information on the roles of instrument development teams can be found in the AO Library document [NGST Instrument Development Team and Science and Operations Center Roles and Responsibilities](#).

3.7.3 Mid-infrared Instrument Science Lead Investigation

Given proposals of sufficient merit, NASA intends to select one MIRI Science Lead investigation. The MIRI Science Lead will be responsible for leading the MIRI Science Team which will provide scientific input for the MIRI, and for working with the designated NASA Center during the detailed design and construction phases to maximize the effectiveness of engineering trades and to ensure the proposed science remains feasible. The MIRI Science Lead will be the head of the MIRI IDT responsible for, in collaboration with NASA, STScI, and ESA, the instrument controlling software and the instrument commissioning and calibration (see Table 3-1). The MIRI Science Lead will be allocated an independent budget to administer a modest staff required by him/her to enable any technical studies required and may propose to do hardware work as negotiated with the NASA center and ESA. The MIRI Science Lead will also be a member of the NGST SWG.

3.7.4 Mid-infrared Instrument Science Team Member Investigation

Given proposals of sufficient merit, NASA intends to select four MIRI Science Team Member investigations. Expertise in MIR detectors and experience in instrument development are sought in MIRI Science Team Members. The MIRI Science Team will (apart from carrying out the proposed scientific investigation) be responsible for refining the science capabilities of the MIRI and for providing scientific input for the MIRI.

3.7.5 Facility Scientist Investigation

Given proposals of sufficient merit, NASA intends to select a Facility Scientist investigation for NGST. The specific duties of the NGST Facility Scientist (apart from carrying out the proposed scientific investigation) will be to provide support for the end-to-end NGST system engineering effort, to act as an astronomical community advocate, to provide an independent assessment of the expected scientific performance of NGST, and to serve as a senior scientist on the SWG. The Facility Scientist will be a full member of the NGST SWG.

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3.7.6 *Telescope Scientist Investigation*

Given proposals of sufficient merit, NASA intends to select a Telescope Scientist investigation for NGST. The specific duties of a NGST Telescope Scientist (apart from carrying out the proposed scientific investigation) will be to actively support observatory systems engineering work, to provide practical knowledge of telescope design, manufacture, operations, and wave front control and sensing and, in cooperation with the NGST Program Office, to provide practical oversight during the development and testing of the NGST optics. The Telescope Scientist will be a full member of the NGST SWG and a member of the Optical Telescope Element (OTE) Integrated Product Team.

3.7.7 *Interdisciplinary Scientist Investigations*

Given proposals of sufficient merit, NASA intends to select four Interdisciplinary Scientist investigations. IDS's will (apart from performing their scientific investigations) be full members of the NGST SWG. Proposers for IDS should possess a broad knowledge of astronomy and astrophysics and be effective user-community advocates for NGST. They should be able to assess observatory capabilities with respect to broad areas of scientific interest. IDS proposals may involve theoretical investigations that address areas of astronomy and astrophysics of importance to the science objectives of NGST (see the [Science Objectives and Capabilities of NGST](#) document in the NGST AO Library). Given proposals of sufficient merit, NASA intends to select at least one IDS proposal that involves a theoretical investigation and one that focuses on planetary investigations.

3.8 **Data Rights, Use, and Publication**

The following rules apply to rights, use, and publication of data from the NGST:

- i. Full Members of the SWG will be Guaranteed Time Observers (GTO's). The amount of GTO time will be 900 hours per instrument science team and 900 hours to be divided among the other non-instrument SWG members as a group (~6 members: FS, TS, IDS's; see table 3.1). This time represents a sum measured from the time the GTO observation sequence is initiated by the NGST Observatory to the time the next observation sequence is initiated. GTO investigations must be completed within 24 months of launch. When estimating the duration of their GTO investigations proposers should assume the NGST Level 2 requirement of 70% observing efficiency on the entire system (observatory plus ground system). In the event that the NGST mission duration extends beyond the baseline 5 years duration, the above GTO time allocations will not be increased.
- ii. There is a 12 month proprietary period for any data collected as part of programs proposed for this AO. The proprietary period begins when an observation enters the STScI data archive.
- iii. A portion of NGST data will be released early as public releases and postings on the World Wide Web or equivalent. These Early Release Observations (ERO) will be organized by the STScI in collaboration with the instrument PI's.

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- iv. Science instruments will undergo a commissioning period of no more than six months from the time when the observatory is capable of supporting instrument commissioning. This commissioning period will carry out instrument checkout and calibration. Calibration observations made during commissioning will not be assessed against GTO time. After calibration and formatting, the data from the NGST are to be placed in the STScI data archive for access by the scientific community. Data in this archive will contain the appropriate calibration information, and ancillary data that will be updated throughout the period of investigation.
- v. NASA expects that all investigators selected through this AO will publish their results in a timely manner in the open scientific literature.

The instrument teams will define, in accordance with the above rules and those reached in advance with CSA and/or ESA, the data rights within teams.

Table 3-1 Proposal Class Aspects

| Proposal Category | Deliverables | SWG Member | NGST Program Interface | Approx. GTO time (hrs) | Approx. PI effort (FTE) | PI restrictions | Number selected via this AO |
|-------------------------------|---|------------|------------------------|------------------------|-------------------------|-----------------|-------------------------------------|
| NIRCam Principal Investigator | Fully qualified flight hardware, calibration and commissioning plans, analysis tools, documentation | Yes | ISIM Project | 900 | 1.0 | U.S. only | 2 Phase A studies, down select to 1 |
| Facility Scientist | None | Yes | SWG | 260 | 0.5 | U.S. only | 1 |
| Telescope Scientist | None | Yes | Observatory Project | 210 | 0.5 | U.S. only | 1 |
| MIRI Science Lead | MIRI teaming plan, algorithms for instrument operation, calibration plans, commissioning plans, analysis tools, documentation | Yes | ISIM Project | 210 | ** | U.S. only | 1 |
| MIRI Science Team Member | None | No | MIRI Science Team | 60 | 0.25 | U.S. only | 4 |
| Interdisciplinary Scientist | None | Yes | SWG | 110 | 0.25 | Open | 4 |

** PIs for MIRI Science Lead are free to propose the level of effort they deem necessary to successfully coordinate the MIRI Science Team, and to deliver the items listed in table 3-1.

3.9 Education and Public Outreach

OSS expects education and public outreach to be a significant part of each OSS flight program and research discipline, and strongly encourages space science researchers to engage actively in education and public outreach as an important component of their NASA-supported professional

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activities. In order to achieve this goal, OSS has developed a comprehensive approach for making education at all levels (with a particular emphasis on K-14 education) and the enhancement of public understanding of space science integral parts of all of its missions and research programs. The two key documents that establish the basic policies and guide all OSS education and outreach activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), and an accompanying implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (1996). Both documents are available online at the following URL <<http://spacescience.nasa.gov/education/resources/strategy/index.htm>>, or from Dr. Jeffrey Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington, DC 20546-0001, USA.

In accord with these established OSS policies, Education and Public Outreach (E/PO) will be an integral element of the NGST Program, and 2% of the U.S. component for total proposed budget available for this AO will be allocated to E/PO activities. Therefore, NASA-funded participants through this AO are required to become actively involved in planning and implementing an E/PO program. The NIRCам investigations will not be required to implement E/PO portions of their proposals until after the downselection to a single NIRCам team.

The approach being taken to involving scientists in the NGST in E/PO has been specifically tailored to recognize that, in general, there are two broad classes of scientific participants whose investigations will be of very different scientific and financial scope. Expectations concerning the nature of participation in E/PO for these two classes of scientific investigations are different.

- 1) NIRCам investigations are required to include an E/PO component as a part of their overall proposal. OSS expects that a substantive education/outreach program will be an integral element of the investigation and that proposers will devote adequate resources to the planning and implementation of such an effort. The general funding guidelines for E/PO for the mission as a whole also apply to the E/PO component of instrument investigations. Proposals must include a single page description outlining the proposed E/PO activities that will be developed further during the NIRCам Phase A study.
- 2) Telescope Scientist, Facility Scientist, MIR Science Lead and Team Members and Interdisciplinary Scientist investigations will be expected to participate in the NGST Outreach program, led by the Office of Public Outreach (OPO) at STScI. OSS expects that individual participating scientists (including members of their supporting team) must be prepared to spend an average of approximately 5% of their NGST time, as part of their normal ongoing work, supporting Education/Public Outreach activities. Such activities may include, but not be limited to: developing ideas for creative and worthwhile educational materials; preparing written background information suitable for primary and secondary school educational resources; and preparing portions of their mission's data for use in educational and public outreach materials. Proposals must include an explicit statement that proposers are willing to participate in E/PO on this basis and must budget both time and funds appropriately for such work as part of their proposal.

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It should be noted that, NASA-funded investigator teams will be expected to become actively involved in creating, designing, planning, and implementing a Education/Public Outreach program to be carried out by the OPO. Several steps will be taken after selection to define, ensure and enable active participation in one common program and to coordinate and integrate unique instrument investigator E/PO programs into the overall program. These include planning workshops that will focus on ways to fulfill NASA's education and outreach objectives, to encourage the flow of creative ideas, to inspire innovative approaches, and to define and implement an integrated E/PO program. Components will be integrated through a variety of collaborative processes designed to produce a consensus for one overall Education/Public Outreach Plan that will meet NASA's and OSS's education and outreach objectives.

3.10 Schedule and Cost Requirements

3.10.1 Schedule Requirements

NASA intends to launch the NGST in December 2008. In order to satisfy this schedule, the NIRCам PI shall deliver a fully qualified instrument to the Goddard Space Flight Center approximately 24 months prior to launch for integration into the ISIM and for testing. Proposals involving flight hardware must clearly identify sufficient reserves (both schedule and financial) to ensure on-time delivery of the instruments. The baseline NGST mission duration is five years. After this prime mission period, NASA may undertake an extended mission wherein the NGST spacecraft is operated beyond its nominal lifetime. Proposals to this AO should ignore the possibility of an extended mission. The Project Schedule, as currently established, is summarized in Table 3-2.

Table 3-2. Schedule for NGST Launch in 2008

| | |
|------------------------------------|-----------------------------|
| NGST Phase A | April 1999 – September 2001 |
| NGST Phase B | September-2001 – March 2004 |
| Preliminary Design Review | September 2003 |
| Confirmation | March 2004 |
| NGST Phase C/D | March 2004 – June 2009 |
| Critical Design Review | September 2004 |
| Flight Instrument delivery to GSFC | July 2006 |
| Launch | December 2008 |
| Phase E – Prime Mission | June 2009 – June 2014 |

3.10.2 Limitations on Funding for NIRCам PI Proposals

NASA has only a limited amount of funding for the selected investigations. During mission development, instrumentation efforts which exhibit cost growth above the proposed cost limits will be viewed as threatening the success of the mission and may lead to the descopeing or even removal of the investigation team from the mission or replacement of the PI.

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Funding guidelines can be found in the [Cost Estimating Relationships and Guidelines](#) document in the NGST AO Library. These guidelines include a cost profile for each of the mission phases.

NIRCam PI Proposers must estimate the Total NASA Cost in their proposals and, if selected through this AO, in much more detail in the NIRCam Phase A concept study report. The Total NASA Cost is defined as all costs that are necessary to be borne by NASA to complete the proposed investigation beginning with NIRCam Phase A through Phase E, including reserves. In general, proposers must assume all costs and fees must be included unless specifically excluded by provisions in this AO. Since cost details are not anticipated until the conclusion of the concept study, cost estimates in the proposal may be generated with models or cost estimating relationships from analogous investigations. Investigations may be descope to meet cost constraints. Therefore, the proposer shall describe a risk management approach that identifies a prioritized plan for removal of science objectives along with the estimated cost savings at each step. In addition proposers must include an explicit descope pathway for the case where the proposed CSA contribution to the NIRCam PI investigation is not included.

3.11 Full Cost Accounting

If a proposal offers NASA-provided services, the proposed budget must include the full cost of Civil Service labor and NASA Center infrastructure support. If NASA guidance for full cost accounting has not been fully developed by the closing date for proposal submission, NASA Centers must submit cost proposals based on the instructions in the NASA Financial Management Manual, Section 9091-5, “Cost Principles for Reimbursable Agreements,” or based on their own, Center-approved, full-cost accounting models. Other Federal Government elements of proposals must follow their agency’s cost accounting standards for full cost. If no standards are in effect, the proposers must then follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board.

3.12 Technological Requirements

NIRCam proposals that include non-Government furnished technologies that have no flight heritage must include a detailed, credible plan for demonstrating how these technologies will reach a NGST Technological Readiness Level of 6 (TRL 6) (see [NGST Technology Readiness Levels](#) in the NGST AO Library) by March 31, 2004.

3.13 Non-NASA Government Agency Participation

Participation by U.S., non-NASA government agencies as Co-Investigators, or team members in NGST investigations is permitted. Participation may include, but is not limited to, the contribution of instrument hardware, necessary facilities and services, and the subsequent sharing of data from the mission. These contributions must not increase NASA’s costs during any mission phase (A through E).

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3.14 International Participation

Participation by non-U.S. individuals and organizations is permitted with some restrictions for PIs (see Table 3-1). Participation may include, but is not limited to, the contribution of instrument hardware, necessary facilities and services, and the subsequent sharing of data from the mission, all on a no-exchange-of-funds basis. These contributions must not increase NASA's cost or risk during any mission phase (A through E).

The direct purchase of goods and/or services from non-U.S. sources is also permitted. Proposers are advised, however, that a contract or subcontract by a U.S. team with a non-U.S. participant using funds derived from NASA must meet NASA and Federal regulations. Proposers are further advised that these regulations will place an additional burden on investigation teams that must be explicitly included in discussions of the investigation's cost, schedule, and risk management.

Participation by non-U.S. individuals and/or institutions as team members or contributors to NGST investigations must be endorsed by the institutions and/or governments involved. If government support is required, then a government endorsement is also needed. The letter of endorsement must provide evidence that the non-U.S. institution and/or government officials are aware and supportive of the proposed investigation and will pursue funding for the investigation if selected by NASA. Such endorsements must be submitted per the appropriate schedule in Section 6.0.

Proposals that include international participation, either through involvement of foreign nationals and/or involvement of foreign entities must include a section discussing compliance with U.S. export laws and regulations; *e.g.*, 22 CFR 120-130, *et seq.* and 15 CFR 730-774, *et seq.*, as applicable to the scenario surrounding the particular international participation. The discussion must describe in detail the proposed international participation and is to include, but not be limited to, whether or not the international participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available through Internet URL's <http://www.pmdtc.org/> and <http://www.bxa.doc.gov/>. Prospective proposers are advised that under U.S. law and regulation, spacecraft and their specifically designed, modified or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, *et seq.* (see <http://hqiso9000.hq.nasa.gov/>)

It is the policy of NASA to establish formal international agreements with foreign partners in cooperations on flight missions. Should a non-U.S. proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the foreign sponsor will each bear the cost of discharging their respective responsibilities.

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For major contributions, either foreign partner to a U.S. program or by a NASA-funded party to a foreign-led program, these agreements will be either a Memorandum of Understanding (MOU) or an implementing agreement under a framework agreement. Examples of major contributions are provision of an entire instrument, a launch, or a major spacecraft subsystem.

For less significant exchanges, the agreement for the entire cooperation may take the form of a letter of Agreement (LOA). Alternatively, for some major exchanges that will eventually be covered by a MOU or implementing agreement, it may be necessary to establish a study phase LOA that will remain in force until later entry into force of the MOU or implementing agreement. A common example of the latter situation would be a study phase award that entails only a minor U.S. Government financial commitment but requires the legal and/or export control framework provided by formal international agreement. Whether an agreement is required during the concept study phase must be determined on a case-by-case basis.

For those cooperative contributions that will entail execution of a LOA (in lieu of a MOU) for either reason, the sponsoring foreign entity's letter of endorsement to support the proposed foreign contribution (if selected) must contain either (1) a clear statement that the sponsoring foreign entity is legally empowered to bind its own national government or (2) advance agreement that any LOA's required will be governed by U.S. law.

NASA will notify the Principal Investigators of all proposals, selected or not selected, of their selection status. In the event that a non-U.S. proposal is selected, NASA will contract with a U.S. lead entity for performance of the U.S.-funded elements of the investigation.

4.0 PROPOSAL PREPARATION AND SUBMISSION

4.1 Preproposal Activities

4.1.1 NGST AO Library

The NGST AO Library provides hypertext links for additional requirements and background information on the NGST program, including science goals, observatory capabilities, management plans, and requirements documents. Information on the NGST AO Library is contained in Appendix C.

It shall be understood by prospective proposers that, while every effort will be made to ensure that information in the NGST AO Library will be as current as possible, many of the final NGST specifications will not be determined until the prime contractor and instruments are actually chosen and the Science Working Group is established and functioning.

4.1.2 Scientific and Technical Inquiries

Scientific and technical questions concerning this AO may be directed to the NASA Headquarters NGST Program Scientist:

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Dr. Hashima Hasan
Astronomy and Physics Division
Code SZ
Office of Space Science
NASA Headquarters
Washington, DC 20546-0001
Telephone: 202-358-0692
Fax: 202-358-3097
E-mail: instrumentao@ngst.gsfc.nasa.gov

Comments and questions on this draft AO may be submitted by prospective proposers by letter or E-mail to the NGST Program Scientist and may cover any phase of the NGST program. All questions and answers will be posted at the NGST AO Announcements Homepage (see Section 4.1.3). The author(s) of such questions will not be identified.

4.1.3 NGST AO Announcements Homepage

A NGST AO Announcements Homepage, available at the URL <http://www.ngst.nasa.gov/cgi-bin/doc?Id=871>, will provide updates during the NGST AO solicitation process. It will provide links to the NGST AO Library, information about the preproposal conference, and responses to frequently asked questions. In order to inform prospective proposers of any significant changes in the NGST Program, especially concerning the resources likely to be available for the instruments, plans for mission development, operations, data analysis, and expected Program schedule information will be posted at the NGST AO Announcements Homepage.

4.1.4 Preproposal Conference

A preproposal conference covering all types of proposals solicited by this AO will be held at the NASA Headquarters, 300 E Street SW, Washington, DC, beginning at 8:30 a.m. on the date given in Section 6.0. The conference will begin with a presentation of answers to questions received up to that time about the AO. Following the presentation, the conference will be open to questions from the attendees. Although representatives from NASA (including those from NASA center designated as the MIRI development center), ESA, CSA, and the NGST Program Office at Goddard Space Flight Center will attempt to answer the questions at the conference, some questions may have to be researched and answered later. In any case, the answers to all questions and a transcript of the conference will be available on request from the NGST Program Scientist.

4.1.5 Notice of Intent to Propose

NASA strongly encourages all prospective proposers to submit a Notice of Intent in accordance with the schedule in Section 6.0. Proposers must prepare this Notice of Intent in English and submit it electronically following the procedures given in the appropriate Guidelines for Proposal Preparation appendix.

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To the extent that the proposer knows the following information by the due date, the Notice of Intent should include:

Names, addresses, telephone numbers, E-mail addresses, and fax numbers of (1) the Principal Investigator; (2) any Co-Investigators known by the NOI due date; and (3) the lead representative from each organization (industrial, academic, educational, nonprofit, and/or Federal) expected to be included in the proposal team; A Title of the proposed investigation; An indication of which type of investigations it will be (see Section 3.7); and A brief statement of the investigations expected scientific objectives.

Material in a Notice of Intent is for NASA planning purposes only, is confidential, and is not binding on the submitter.

4.2 Format and Content of Proposals

General NASA guidance for proposals is given in Appendix A of this AO, which is considered binding unless specifically amended in this AO. A uniform proposal format is required from all proposers to aid in proposal evaluation. The required proposal format and contents are summarized in Appendix B. Failure to follow this outline may result in reduced ratings during the evaluation process or, in extreme cases, could lead to rejection of the proposal without review.

4.3 Submission Information

4.3.1 Certification

An official of the PI's institution, who is authorized to certify institutional support and sponsorship of the investigation, as well as the management and financial parts of the proposal, must sign the proposal's Cover Page. (See details in appendix B.)

4.3.2 Quantity

Proposers must provide an electronic version (in either Microsoft Word or Adobe PDF format) as well as hard copies (40 for NIRCам proposals; 25 for all other proposal classes) of their proposal, plus the original signed proposal.

4.3.3 Submittal Address

All proposals must be received at the following address by the schedule in Section 6.0:

NGST AO Support Office
NASA Peer Review Services
500 E Street, SW, Suite 200
Washington DC 20024
USA

Point of contact for commercial delivery:

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Ms. Debra Tripp
Phone: 202-479-9030

4.3.4 Deadline

The organization at the submittal address must receive all proposals by 4:30 p.m., local time, by the closing date specified in Section 6.0. NASA will treat all proposals received after the closing date in accordance with NASA's provisions for late proposals (Appendix A, Section VI).

4.3.5 Notification of Receipt

NASA will notify the proposers in writing or by E-mail that their proposals have been received. Proposers not receiving this confirmation within two weeks after submittal of their proposals should contact the address in Section 4.3.3.

5.0 PROPOSAL EVALUATION, SELECTION AND IMPLEMENTATION

5.1 Evaluation and Selection Process

All proposals submitted in response to this AO will be subjected to a preliminary screening to determine compliance with the constraints, requirements, and guidelines of this AO. Proposals not in compliance will be returned to the proposer without further review.

NIRCam PI proposals that pass this preliminary screening will first be evaluated by a technical, management, and cost (TMC) peer review panel for technical, management, and fiscal integrity and for compliance with the interface requirements stated in the appropriate NGST AO Library document. The feasibility of the proposed approach for implementation will be evaluated against the criteria in Section 5.2.3. The NGST Program Office will provide expert input to the TMC panel on the impact of the proposed instrument on NGST. The STScI will provide expert input to the TMC panel on operational issues. The CSA will provide an assessment to the TMC panel on the feasibility of the proposed Canadian participation. Following the review by the TMC panel the merits of each proposal will be assessed against the remaining criteria in section 5.2 by a panel of scientific and technical peers of the proposers. Science peer panels will include members from CSA approved Canadian institutions. Results of the earlier feasibility and cost reviews by the TMC panel will be available to the science peer reviewers.

Proposals for other classes that pass the preliminary screening will be evaluated against the criteria in Sections 5.3-5.5 by a panel of scientific and technical peers. The purpose of the science peer evaluation is to determine the scientific and technical merit of each proposal expressed in terms of its inherent strengths and weaknesses.

Peer review panels for all proposal classes may be augmented through the solicitation of mail-in reviews, which the panels have the right to accept, in whole or in part, to modify, or to reject. NASA may use a non-Government organization to provide assistance in organizing and documenting the panel review process.

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Once the evaluations are complete, an *Ad Hoc* Subcommittee of the Space Science Steering Committee (see below), composed wholly of Civil Servants, will convene to consider the evaluation results. This Subcommittee will categorize the proposals in accordance with procedures required by NASA FAR Supplement Part 1872.0 according to the Categories defined below.

Category I. Well conceived and scientifically and technically sound investigation pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

Category II. Well conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.

Category III. Scientifically or technically sound investigations which require further development.

Category IV. Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

The Space Science Steering Committee, which is composed wholly of NASA Civil Servants and appointed by the Associate Administrator for Space Science, will consider the results of the evaluations and categorizations. The Steering Committee will conduct an independent assessment of the evaluation and categorization processes regarding compliance with established policies and practices, as well as the completeness, self-consistency, and adequacy of all materials related thereto.

After this assessment, the NGST Program Scientist will submit the final evaluations and categorizations to the Source Selection Official who will make the final selections based on the evaluation criteria in Sections 5.2-5.5 and on the cost factors outlined in Section 1.4. The Associate Administrator for Space Science will be the Source Selection Official for this opportunity.

5.2 Evaluation Criteria for NIRCam Principal Investigator Proposals

Compliant proposals will be evaluated for their intrinsic scientific and technical merits, as defined more fully in the subsections below. The evaluation criteria and their percentage weights, given in parentheses, are:

- Scientific Merit and Relevance to Mission Objectives (40);
- Technical Merit and Probability of Success (30);
- Cost Risk and Feasibility of Implementation Plan (30).

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5.2.1 *Scientific Merit and Relevance to Mission Objectives*

The goals and objectives of the proposed investigation will be assessed to determine the intrinsic scientific merit of the proposed investigation and its relevance to the specific opportunity described in this AO. The evaluation will include an assessment of the degree to which the proposal offers to meet the appropriate NGST science objectives (see Section 2.2). The impact on the science objectives caused by a descope of the instrument will also be evaluated.

5.2.2 *Technical Merit and Probability of Success*

Each proposed investigation will be evaluated for its technical merit and probability of success. Technical merit will be evaluated by assessing the degree to which the investigation will address the proposed scientific goals and objectives and the degree to which the proposed instrumentation can provide the data needed to complete the proposed investigation. The evaluation will include an assessment of whether the proposed instrumentation can acquire the necessary data, whether the proposed integrated and coordinated observing sequence will be sufficient to complete the proposed investigation, and whether an adequate data reduction and analysis plan exists.

The probability of success will be evaluated by assessing the degree of technical risk associated with the proposed instrumentation, by assessing the degree to which the proposed data-acquisition strategy is likely to succeed, and by assessing the scientific and technical competence of the proposed team. Evaluation of the technical risk will include an assessment of the readiness for flight of the proposed instrumentation, the adequacy of plans for developing critical technology, the adequacy of technical margins, and the adequacy of a descope plan for the instrumentation that are consistent with the NASA cost cap for NIRCам in the event that the proposed CSA contribution does not materialize. Evaluation of the scientific and technical competence of the proposed team will include an assessment of the relevant experience of the team. (Note: the inclusion of Co-I's who are judged by peer review to have either insignificant or unjustified roles in a proposed program of research will be considered a weakness for purposes of the evaluation of the proposal.)

The evaluation will also include an assessment of the degree of support (logistics, facilities, etc.) offered by the proposing institutions in order to ensure that the investigation can be completed satisfactorily. Proposals will be evaluated for the level of proposed commitment of time and resources from the proposer and his/her institution.

5.2.3 *Cost Risk and Feasibility of Implementation Plan*

During the evaluation of proposals, reviewers will assess the approach to ensure that the cost will remain at or below the proposed cost. The technical and management approaches will be evaluated to assess the likelihood that the investigation can be implemented as proposed. The evaluation will include an assessment of the risk of completing the investigation on schedule and within the proposed cost.

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The evaluation will include assessments of

- The proposer's understanding and planned use of the processes, products, and activities required to accomplish the development, integration, test, and operation of the proposed flight instrumentation and supporting systems;
- The capabilities within the team for systems engineering and concurrent engineering;
- The risk of increased cost to the NGST system;
- The relationship between the work and the project schedule, as well as the adequacy of margin in the proposed schedule;
- The methods and rationale used to develop the estimated cost, as well as the adequacy of reserves in the proposed cost;
- The effectiveness of the proposed implementing organization, including the proposed roles and experience of the partners and the commitments of partners and contributors;
- The competence of the management team; and
- The degree of support (logistics, facilities, etc.) offered by the proposing institutions in order to ensure that the investigation can be completed satisfactorily.

Innovative cost-saving features, processes, or approaches will be rewarded if proven sound. Investigations proposing new technology must describe qualification test plans and/or technology backup plans to ensure success. Adequate budget and schedule reserves must be identified to allow the qualification test and backup plans to be implemented, within the total proposed cost and within the program schedule limits.

The evaluation will include an assessment of the potential for delivering the flight instrumentation to Goddard Space Flight Center according to the schedule in Table 3.2.

5.3 Evaluation Criteria for MIRI Science Lead Proposals

For proposals for MIRI Science Lead investigations, the evaluation criteria and their percentage weights (given in parentheses) are:

- Scientific Merit and Relevance to Mission Objectives (40);
- Scientific Feasibility and Technical Merit (30);
- Suitability for Team Leader Position (30)

5.3.1 Scientific Merit and Relevance to Mission Objectives

The goals and objectives of the proposed investigation will be assessed to determine the intrinsic scientific merit of the proposed investigation and its relevance to the specific opportunity described in this AO. The evaluation will include an assessment of the degree to which the proposal offers to address the appropriate NGST science objectives (see Section 2.2).

5.3.2 Science Feasibility and Technical Merit

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The proposed investigation will be evaluated for the feasibility of acquiring the science data necessary to complete the investigation using the reference telescope and the MISC MIRI concept instrument (within the allotted GTO time), whether the data gathered will be sufficient to complete the proposed investigation, and the adequacy of the proposed data analysis. The proposed investigation will be evaluated to assess the technical and managerial merit of the (a) proposed MIRI Science Team management plan, and (b) plan for working with a designated NASA center for instrument construction (e.g. teaming structures, proposed deliverables). In particular, plans for evaluating engineering trade studies and specific input during each phase of instrument development, and proposed strategies for interacting with the NASA center and ESA collaborators will be evaluated. The evaluation will consider the proposer's understanding of the processes, products, and activities required to accomplish the proposed investigation and instrument management structure. The evaluation will also include an assessment of the degree of support (logistics, facilities, etc.) offered by the proposing institutions in order to ensure that the investigation can be completed satisfactorily. Proposals will be evaluated for the level of proposed commitment of time and resources from the proposer and his/her institution.

5.3.3 Suitability for Team Leader Position

Proposals offering to lead the MIRI Science Team will be evaluated to assess the likelihood of success of the MST under the proposed leadership. The proposals will be evaluated to assess the effectiveness and completeness of the plans and tasks the MIRI Science Lead is responsible for (see table 3-1, and section 3.7.3). The strategy for organizing the MST and the effectiveness of proposed MST processes will be assessed to see if they are likely to bring out the best scientific performance from the MST and if they will meet the needs of the NGST Program. The ability, competence and commitment of the Principal Investigator in leading similar efforts will be evaluated in order to assess the Principal Investigator's skills and stature among scientific peers as a gauge of his or her ability to organize and manage the effort and to lead the negotiations for the team.

5.4. Evaluation Criteria for MIRI Science Team Member Proposals

For proposals for MIRI Science Team Member investigations, the evaluation criteria and their percentage weights (given in parentheses) are:

- Scientific Merit and Relevance to Mission Objectives (50);
- Scientific Feasibility and Technical Merit (20);
- Suitability for Team Membership (30).

5.4.1 Scientific Merit and Relevance to Mission Objectives

The goals and objectives of the proposed investigation will be assessed to determine the intrinsic scientific merit of the proposed investigation and its relevance to the specific opportunity described in this AO. The evaluation will include an assessment of the degree to which the proposal offers to address the appropriate NGST science objectives (see Section 2.2).

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5.4.2 Scientific Feasibility and Technical Merit

The proposed investigation will be evaluated for the feasibility of acquiring the science data necessary to complete the investigation using the reference telescope, MISC MIRI concept instrument (within the allotted GTO time), whether the data gathered will be sufficient to complete the proposed investigation and the adequacy of the proposed data analysis.

5.4.3 Suitability for Team Membership

Proposals offering MIRI Science Team Membership will be evaluated to assess the specific talents, experience and commitment that the proposers would bring to the team, and also to assess the effectiveness and completeness of the plans the MIRI Science Team member is responsible for (see section 3.7.4). The evaluation will include an assessment of the degree of support (logistics, facilities, etc.) offered by the proposing institutions in order to ensure that the investigation can be completed satisfactorily. Proposals will be evaluated for the level of proposed commitment of time and resources from the proposer and his/her institution.

5.5 Evaluation Criteria for Telescope Scientist, Facility Scientist, and Interdisciplinary Scientist Proposals

For proposals for Facility Scientist or Telescope Scientist investigations, the evaluation criteria and their percentage weights (given in parentheses) are:

- Scientific Merit and Relevance to Mission Objectives (40);
- Feasibility and Probability of Success of the Science Investigation (25);
- Suitability for Facility Scientist or Telescope Scientist Position (35).

For proposals for Interdisciplinary Scientist evaluations, the evaluation criteria and their percentage weights (given in parentheses) are:

- Scientific Merit and Relevance to Mission Objectives (60);
- Feasibility and Probability of Success of the Science Investigation (40).

5.5.1 Scientific Merit and Relevance to Mission Objectives

The goals and objectives of the proposed investigation will be assessed to determine the intrinsic scientific merit of the proposed investigation and its relevance to the specific opportunity described in this AO. The evaluation will include an assessment of the degree to which the proposal offers to address the appropriate NGST science objectives (see Section 2.2).

5.5.2 Feasibility and Probability of Success of the Science Investigation

Each proposed investigation will be evaluated for its feasibility and probability of success, based on the reference description of the NGST telescope and instrumentation, and the baseline mission described in the Science Objectives of the NGST document in the NGST AO Library. Feasibility

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will be evaluated by assessing whether the reference telescope and instrumentation suite can acquire the necessary data, the degree to which mission operations can support the acquisition of the required data, whether the data gathered will be sufficient to complete the proposed investigation, and the adequacy of the proposed data analysis. Feasibility will also be evaluated by assessing the degree to which the investigation will address the proposed scientific goals and objectives and the feasibility of obtaining and analyzing the necessary data. The evaluation will consider the proposer's understanding of the processes, products, and activities required to accomplish the proposed investigation. The evaluation will also include an assessment of the degree of support (logistics, facilities, etc.) offered by the proposing institutions in order to ensure that the investigation can be completed satisfactorily.

5.5.3 Suitability for Facility Scientist or Telescope Scientist Position

Proposals offering investigations for Facility Scientist will be evaluated for their quality in demonstrating the ability, competence and commitment of the proposer to provide end-to-end (design through launch and operations) science oversight of the NGST and their ability to represent NGST to the astronomical community. The proposals will be evaluated to assess the effectiveness and completeness of the plans for those elements of NGST science and technical oversight for which the Facility Scientist is responsible (see sections 3.7.5).

Proposals offering investigations for Telescope Scientist will be evaluated for their quality in demonstrating expertise in the design and construction of large optical systems and/or wavefront sensing and control and/or design and construction of space optical systems. The proposals will be evaluated to assess the effectiveness and completeness of the plans for those elements of NGST science and technical oversight for which the Telescope Scientist is responsible (see sections 3.7.6).

5.6 Selection Factors

NASA will select investigations for this opportunity by considering the results of the proposal evaluations -- based on the criteria above -- along with the proposed life-cycle cost (*i.e.*, costs from NGST Phase A through Phase E) to NASA and all relevant science planning, policy, and cost considerations.

For NIRCам PI proposals, life-cycle cost may be a significant discriminator in the selection, and proposers are encouraged to make their best offer. It should also be noted that NASA reserves the right to select only a portion of a proposer's investigation and/or to invite his/her participation with other investigators in a joint investigation. In such a case, all affected proposers will be given the opportunity to accept or decline such partial acceptance and/or participation with other investigators (Appendix A, Section II.)

5.7 Implementation

5.7.1 Notification of Selection and Award Administration and Funding

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NASA will notify the PI's of the selected investigations by telephone, followed by formal written notification. This formal notification will include any issues noted during the evaluation that may require resolution. NASA will also issue a press release about the selection. NASA will notify all other proposers in writing that their investigations were not selected and will offer a debriefing. Such debriefings may be conducted by telephone or, if the Principal Investigator prefers, may be conducted in person at NASA Headquarters. The NGST Program Scientist and, for NIRCam PI proposals, the TMC evaluation chair will give the debriefings. NASA funds may not be used to defray travel costs by the proposer for a debriefing.

A SWG initiation conference will be held as soon as possible after selection to clarify requirements and responsibilities of all parties having roles in the mission. NIRCam Study PI's will be invited to the Initiation Conference.

It is anticipated that the Goddard Space Flight Center will negotiate and award contracts to implement the selected investigations.

For NIRCam PI proposals, contracts will be awarded for Phase A concept studies for up to two investigations selected under this AO. Each contract resulting from this selection will contain a priced option for bridge phase, to be exercised upon the investigation selected to proceed into phase B/C/D. The bridge phase is intended to cover a two month period of Phase B effort to provide program continuity while Phase B/C/D and E contract negotiations are complete.

5.7.2. Phase A Concept Study for NIRCam

The concept studies are intended to provide NASA with more definitive information regarding the cost, risk, and feasibility of the investigations, including the details of CSA contribution, an instrument design consistent with the NASA cost cap in the event that the proposed CSA contribution does not materialize, as well as a detailed plan for the conduct of an appropriate education and outreach plan before final selection for implementation. The product of the concept studies will be reports to be delivered by each selected investigation team six months after the Project Initiation Conference. The content and format of the study reports are specified in the [*Guidelines and Criteria for the NIRCam Phase A Concept Study Report Preparation*](#) NASA will conduct an evaluation of these concept study reports upon completion of Phase A. NASA may request presentations and/or site visits to review the concept study reports with the investigation teams as part of the evaluation process

5.7.3. Down selection of NIRCam Investigations

The down selection will be made by the Associate Administrator for Space Science, based upon NASA review of the Phase A concept study results and programmatic considerations. The criteria for evaluating the concept study are as follows:

- i. Scientific merit
- ii. Technical merit and feasibility
- iii. Feasibility of the proposed approach for mission implementation, including cost risk

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- iv. Quality of plans for incorporating the Canadian contributions
- v. Quality of plans for education and public outreach
- vi. Quality of plans for new technology and small disadvantaged business activities.

The criteria are described in the [*Guidelines and Criteria for the NIRCam Phase A Concept Study Report Preparation*](#)s document in the NGST AO library. Any changes to science and science implementation scheme contained in the Phase A Concept Study Report will be carefully evaluated. Assuming no changes to the first two criteria, the emphasis for down selection will be on the latter four.

As a result of evaluation of the concept studies, NASA expects to downselect to one investigation to proceed to subsequent development phases by exercising contract options of the selected investigation to proceed by exercising its bridge phase options. However, NASA is not required to exercise any option. NASA will not exercise the contract option nor continue funding those investigations not selected to proceed.

6.0 SCHEDULE

The schedule of events associated with this Announcement of Opportunity is:

| | |
|---|-----------------|
| Release AO | TBD |
| Pre-proposal conference | TBD + 15 days |
| Notice of Intent to propose due (see Section 4.1) | TBD + 1 month |
| Proposal due by 4:30 p.m. (Eastern Time) | TBD + 3 months |
| Non-U.S. Letters of Endorsement Due | TBD + 4 months |
| Selection of Investigations | TBD + 7 months |
| Award of Contracts | TBD + 8 months |
| Down selection of NIRCam NIRCam Phase A studies | TBD + 14 months |

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7.0 CONCLUSION

The Next Generation Space Telescope will continue the successes of the Hubble Space Telescope and be the premier infrared observatory of the next decade. The science objectives of NGST are broad ranging and cover many of the most exciting areas of current astrophysical research. We invite you to become a participant in this important and exciting scientific program by proposing through this AO.

Anne L. Kinney
Science Program Director
Astronomical Search for Origins

Edward J. Weiler
Associate Administrator for Space Science

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APPENDIX A

GENERAL INSTRUCTIONS AND PROVISIONS

I. INSTRUMENTATION AND/OR GROUND EQUIPMENT

By submitting a NIRCam PI proposal, the investigator and institution agree that NASA has the option to accept all or part of the offeror's plan to provide the instrumentation and/or ground support equipment required for the investigation or NASA may furnish or obtain such instrumentation or equipment from any other source as determined by the selecting official. In addition, NASA reserves the right to require use, by the selected investigator, of Government instrumentation or property that becomes available, with or without modification, that will meet the investigative objectives.

NOTICE TO ALL OFFERORS: In the event that a Principal Investigator employed by NASA is selected under this AO, NASA will award prime contracts to non-Government participants, including Co-Investigators, hardware fabricators, and service providers who are named members of the proposing team, as long as the selecting official specifically designates the participant(s) in the selection decision. Each NASA contract with hardware fabricators or service providers selected in this manner will be supported by an appropriate justification for other than full and open competition, as necessary.

II. TENTATIVE SELECTIONS, PHASED DEVELOPMENT, PARTIAL SELECTIONS, AND PARTICIPATION WITH OTHERS

By submitting a proposal, the investigator and the organization agree that NASA has the option to make a tentative selection pending a successful feasibility or definition effort. NASA has the option to contract in phases for a proposed experiment and to discontinue the investigative effort at the completion of any phase. The investigator should also understand that NASA may desire to select only a portion of the proposed investigation and/or that NASA may desire the individual's participation with other investigators in a joint investigation, in which case the investigator will be given the opportunity to accept or decline such partial acceptance or participation with other investigators prior to a selection. Where participation with other investigators as a team is agreed to, one of the team members will normally be designated as its team leader or contact point.

III. SELECTION WITHOUT DISCUSSION

The Government reserves the right to reject any or all proposals received in response to this AO when such action shall be considered in the best interest of the Government. Notice is also given of the possibility that any selection may be made without discussion (other than discussions conducted for the purpose of minor clarification). It is, therefore, emphasized that all proposals must be submitted initially on the most favorable terms that the offeror can submit.

IV. NONDOMESTIC PROPOSALS

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The guidelines for proposals originating outside of the United States are the same as those for proposals originating within the United States, except that the additional conditions described in Section 3.14 of the AO and in Appendix D shall also apply.

V. TREATMENT OF PROPOSAL DATA

It is NASA policy to use information contained in proposals and quotations for evaluation purposes only. While this policy does not require that the proposal or quotation bear a restrictive notice, offerors or quoters should place the following notice on the title page of the proposal or quotation and specify the information, subject to the notice by inserting appropriate identification, such as page numbers, in the notice. Information (data) contained in proposals and quotations will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice. To prevent inadvertent disclosure, proposal data shall not be included in submissions (*e.g.* final reports) that are routinely released to the public.

RESTRICTION ON USE AND DISCLOSURE OF PROPOSAL AND QUOTATION INFORMATION (DATA)

The information (data) contained in (insert page numbers or other identification) of this proposal or quotation constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed for other than evaluation purposes; provided, however, that in the event a contract is awarded on the basis of this proposal or quotation, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract. This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

VI. LATE PROPOSALS

The Government reserves the right to consider proposals or modifications thereof received after the date indicated, should such action be in the interest of the Government.

VII. (RESERVED)

VIII. DISCLOSURE OF PROPOSALS OUTSIDE GOVERNMENT

NASA may find it necessary to obtain proposal evaluation assistance outside the Government. Where NASA determines it is necessary to disclose a proposal outside the Government for evaluation purposes, arrangements will be made with the evaluator for appropriate handling of the proposal information. Therefore, by submitting a proposal the investigator and institution agree that NASA may have the proposal evaluated outside the Government. If the investigator or institution desire to preclude NASA from using an outside evaluation, the investigator or

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institution must so indicate on the cover. However, notice is given that if NASA is precluded from using outside evaluation, it may be unable to consider the proposal.

IX. EQUAL OPPORTUNITY

By submitting a proposal, the investigator and institution agree to accept the following clause in any resulting contract:

EQUAL OPPORTUNITY

During the performance of this contract, the Contractor agrees as follows:

- A. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.
- B. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to (1) employment, (2) upgrading, (3) demotion, (4) transfer, (5) recruitment or recruitment advertising, (6) layoff or termination, (7) rates of pay or other forms of compensation, and (8) selection for training, including apprenticeship.
- C. The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.
- D. The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.
- E. The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding the notice to be provided by the Contracting Officer, advising the labor union or workers' representative of the Contractor's commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.
- F. The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.
- G. The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. Standard Form 100 (EEO-1), or any successor form, is the

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prescribed form to be filed within 30 days following the award, unless filed within 12 months preceding the date of award.

- H. The Contractor shall permit access to its books, records, and accounts by the contracting agency or the Office of Federal Contract Compliance Programs (OFCCP) for the purposes of investigation to ascertain the Contractor's compliance with the applicable rules, regulations, and orders.
- I. If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, the contract may be canceled, terminated, or suspended in whole or in part, and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended, the rules, regulations, and orders of the Secretary of Labor, or as otherwise provided by law.
- J. The Contractor shall include the terms and conditions of subparagraph I through 9 of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.
- K. The Contractor shall take such action with respect to any subcontract or purchase order as the contracting agency may direct as means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

X. PATENT RIGHTS

- A. For any contract resulting from this solicitation awarded to other than a small business firm or nonprofit organization, the clause at 1852.227-70, New Technology, shall apply. Such contractors may, in advance of a contract, request waiver of rights as set forth in the provision at 1852.227-71, Requests for Waiver of Rights to Inventions.
- B. For any contract resulting from this solicitation awarded to a small business firm or nonprofit organization, the clause at FAR 52.227-11, Patent Rights -- Retention by the Contractor (Short Form) (as modified by 1852.227-11), shall apply.

XI. SMALL AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING

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- A. Offerors are advised that, in keeping with Congressionally mandated goals, NASA seeks to place a fair portion of its contract dollars, where feasible, with small disadvantaged business concerns, women-owned small business concerns, Historically Black Colleges and Universities, and minority educational institutions, as these entities are defined in 52.219-8 and in 52.226-2 of the FAR. For this Announcement of Opportunity, NASA has established a recommended goal of 8 percent for the participation of these entities at the prime and subcontract level. This goal is stated as a percentage of the total contract value. NASA encourages all offerors to meet or exceed this goal to the maximum extent practicable and to encourage the development of minority businesses and institutions throughout the contract period. Offerors will be evaluated on the proposed goal for participation of the entities listed above in comparison with the 8 percent goal and on the methods for achieving the proposed goal.

- B. Offerors are advised that for NASA contracts resulting from this solicitation which offer subcontracting possibilities, exceed \$500,000, and are with organizations other than small business concerns, the clause FAR 52.219-9 shall apply. Offerors who are selected under this AO will be required to negotiate subcontracting plans which include subcontracting goals for small, small disadvantaged, and women-owned small business concerns. Note that these specific subcontracting goals differ from the 8 percent goal described in paragraph A above, and need not be submitted with the proposal. Failure to submit and negotiate a subcontracting plan after selection shall make the offeror ineligible for award of a contract.

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APPENDIX B

SPECIFIC GUIDELINES FOR PROPOSAL PREPARATION IN RESPONSE TO THIS AO

The following guidelines apply to the preparation of proposals by potential investigators in response to this NGST Announcement of Opportunity (AO). The material presented is a guide for the prospective proposer, and is not intended to be all encompassing. The proposer must, however, provide information relative to those items applicable or as otherwise required by the Announcement of Opportunity. In the event of an apparent conflict between the guidelines in this Appendix and those contained with the body of the AO, those within the AO shall take precedence.

GENERAL GUIDELINES

All documents must be typewritten in English, use the metric or astronomical system of units, and be clearly legible. Submission of proposal material by facsimile (fax), videotape, floppy disk, etc., only is not acceptable. In evaluating proposals, NASA will only consider printed material. No proposal may reference a WWW site for any data needed to understand or complete the proposal.

The proposal must consist of only one volume, with readily identified sections corresponding to sections A through I given below. Proposals shall adhere to the page limits in Table B-1, including no more than two fold-out pages (28 x 43 cm; *i.e.*, 11 x 17 inches) that count as one page each. All pages other than fold-out pages shall be 8.5 x 11 inches or A4 European standard. The cover, table of contents, required cost table(s) and appendices will not be counted against the page limit; for the remainder, every side upon which printing appears will be counted against the page limits.

Single- or double-column format is acceptable. In complying with the page limit, no page shall contain more than 55 lines of text and the type font shall not be smaller than 12-point Times (*i.e.*, no more than 15 characters per inch). Smaller font is allowed within figures and in the cost table(s).

In order to allow for recycling of proposals after the review process, all proposals and copies must be submitted on plain white paper only (*e.g.*, no cardboard stock or plastic covers, no colored paper, etc.). Proposers are not permitted to use three-ring binders. Photographs and color figures are permitted if printed on recyclable white paper only. The original signed copy (including cover and endorsements) must be bound in a manner that makes it easy to disassemble for reproduction. Except for the original, two-sided copies are preferred.

The proposal must consist of two parts, Scientific Investigation Proposal and Cost Proposal, bound in a single volume. The Scientific Investigation Proposal must consist of a main body and optional appendices. All pertinent information necessary for a sound scientific assessment of the proposed investigations must be contained in the main body of the proposal. No appendices

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other than those in Tables B-1, B-2 and B-3 are permitted. The Cost Proposal must summarize the estimated total investigation cost for all phases of the investigation, including data analysis. Cost Proposals are required for U.S. investigations only. There are no page limits on the Cost Proposal.

TABLE B-1: PAGE LIMITS FOR NIRCAM PRINCIPAL INVESTIGATOR PROPOSALS

| Section | Section | Page Limits |
|---------|--|--|
| A | Cover Page | 1 |
| A | Investigation Summary (Web Form) | no page limit |
| B | Table of Contents | no page limit |
| C | Executive Summary (including 2 page Fact Sheet) | 6 |
| D | Science Investigation and Technical Description (must include a separate section detailing Canadian descope changes for science and technical aspects of the investigation) | 60 |
| E | Current and Pending Support | no page limit |
| F | Education and Public Outreach, New Technology, and Small Disadvantaged Business Plan | 1 |
| G | Management Proposal | no page limit |
| H | Cost Proposal (must include a separate section detailing Canadian descope changes for costs) | no page limit |
| I | Appendices: (no others permitted) Resumes (2 pages for PI, 1 page for each other investigator) Letter(s) of Endorsement NASA PI Proposing teams (1 page) Reference List (optional) Acronyms List (optional) Statement(s) of Work (SOW) Draft International Agreement(s) Model Contract | no page limit, but small size encouraged |

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TABLE B-2: PAGE LIMITS FOR MIR SCIENCE LEAD PROPOSALS

| Section | Section | Page Limits |
|---------|--|--|
| A | Cover Page | 1 |
| A | Investigation Summary (Web Form) | no page limit |
| B | Table of Contents | no page limit |
| C | Executive Summary (Fact Sheet optional) | 4 |
| D | Science Investigation description including E/PO statement | 16 |
| E | Current and Pending Support | no page limit |
| G | Management Proposal | no page limit |
| H | Cost Proposal | no page limit |
| I | Appendices: (no others permitted) Resumes (2 pages for PI) Letter(s) of Endorsement Reference List (optional) Acronyms List (optional) | no page limit, but small size encouraged |

TABLE B-3: PAGE LIMITS FOR TELESCOPE, FACILITY, MIR SCIENCE TEAM AND INTERDISCIPLINARY SCIENTIST PROPOSALS

| Section | Section | Page Limits |
|---------|--|--|
| A | Cover Page | 1 |
| A | Investigation Summary (Web Form) | no page limit |
| B | Table of Contents | no page limit |
| C | Executive Summary (Fact Sheet optional) | 4 |
| D | Science Investigation description | 16 |
| E | Current and Pending Support | no page limit |
| H | Cost Proposal | no page limit |
| I | Appendices: (no others permitted) Resumes (2 pages for PI) Letter(s) of Endorsement Reference List (optional) Acronyms List (optional) | no page limit, but small size encouraged |

The content of each proposal shall be as follows:

A. COVER PAGE AND INVESTIGATION SUMMARY

A Cover page and Investigation summary must be a part of the proposal, but will not be counted against the page limit. The Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization must sign the

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cover page. This authorizing signature now also certifies that the proposing institution has read and is in compliance with the three required certifications printed in full in Appendix D. Certifications do not need to be submitted separately.

The full names of the Principal Investigator and the authorizing official, their addresses with zip code, telephone and fax numbers, and electronic mail addresses, shall be included in the cover. Additional information, including the names, institutions, and E-mails of all participants, type of instrument(s) proposed, total investigation cost, and a 200-word summary shall also be included.

The Cover Page and Investigation Summary must be submitted electronically to the WWW site located at <<http://props.oss.hq.nasa.gov/>>. A hard copy version of this Cover must be printed in time to acquire signatures and include with the original hard copy of the proposal for delivery according to the schedule provided in Section 6.0 in this AO. Proposers are advised that they must not reformat this Cover when it is printed, as important NASA-required documentation may be lost. Proposers without access to the Web or who experience difficulty in using this site may contact Ms. Debra Tripp (E-mail: dtripp@hq.nasa.gov) for assistance. Please note that submission of the electronic Cover does not satisfy the deadline for proposal submission.

It is NASA's intent to enter the Summaries of all selected investigations for its various programs into a publicly accessible database. Therefore, the Summary must not contain any proprietary or confidential information that the submitter wishes to protect from public disclosure.

B. TABLE OF CONTENTS

The proposal must contain a Table of Contents. This Table of Contents must parallel the outlines provided below in Sections C through I.

C. EXECUTIVE SUMMARY, INCLUDING FACT SHEET

The Executive Summary must provide an overview of the investigation, including its scientific objectives, instrumentation (if proposed), operational approach, educational and societal opportunities, management plan, and cost plan.

The Fact Sheet provides a brief summary of the proposed investigation and must be included in NIRCам PI proposals. The information conveyed on the Fact Sheet must include the following: science objectives (including the importance of the science to the NASA space science program and the NGST mission objectives), key technical characteristics, management of the investigation (including teaming arrangements), schedule, and cost estimates. Other relevant information, including figures or drawings, may be included at the proposer's discretion. The Fact Sheet is restricted to two pages (preferably a double-sided single sheet).

D. SCIENCE INVESTIGATION

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The science section must describe the scientific objectives of the proposed investigation, including the value of the investigation to the NGST mission objectives. A discussion of the scientific products and how the science products and data obtained will be used to fulfill the scientific objectives must be provided. A discussion of how the science data will be obtained, including a plan for delivery of the products, and the individuals responsible for the data delivery, must also be provided.

1. Scientific Goals and Objectives. This section must consist of a discussion of the goals and objectives of the investigation, their value to NASA's Origins science theme and to the specific NGST objectives described in this AO, and their relationships to past, current, and future investigations and missions. It must describe the history and basis for the proposal and discuss the need for such an investigation. The observations to be taken in the course of the science investigation, the data to be returned, and the approach that will be taken in analyzing the data to achieve the scientific objectives of the investigation must be discussed. This description must identify the investigation to be performed, the quality of the data to be returned (resolution, coverage, pointing accuracy, measurement precision, etc.), and the quantity of data to be returned (bits, images, etc.). The relationship between the data products generated and the scientific objectives must be explicitly described. The improvement over current knowledge that the results of the investigation are expected to provide must be clearly stated.

For instrumentation proposals, tradeoffs between data volumes, rates, and compression factors must be considered and any plans that can reduce the proposed instrument's drain on telemetry resources should be highlighted.

2. Science Implementation.

i. NIRCam PI Proposals only

- a. Instrumentation. This section must describe the instrumentation and the criteria used for its selection. While it is not expected that full details of instrument design will be available until completion of further studies, the information requested in the following paragraphs will aid in proposal review and, thus, must be provided to the extent known. This section must identify the individual components (including any mechanisms supplied by the proposer) and instrument systems, including their characteristics and requirements.

In particular, the proposal must describe all parameters of the instrument that are pertinent to the accommodation of the instrument within the spacecraft resources and configuration advertised in this AO (and updated on NGST AO Announcement Homepage) plus any special requirements necessary for successful implementation. This information must be given in sufficient detail to permit an evaluation of both the concept and the practical feasibility of the hardware. These resources include, but are not limited to: volumetric envelope, mass, power and thermal requirements (including preferred thermal limits);

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telemetry and command requirements; environmental sensitivities (*e.g.* to electrical cleanliness, magnetic fields, and contamination); any special spacecraft or launch vehicle integration requirements or constraints; pointing requirements; and on-board data processing. The power discussion must outline both cruise and peak power use, and a time profile of power needs. The instrument-level reserve for spacecraft resources such as mass and power must also be identified. Definitions for reserve and margin and some examples are given at the end of this section.

The proposal must outline items that are proposed to be developed, as well as any existing instrumentation or design/flight heritage. The heritage of various parts of the instrumentation, supporting systems, and software must be described. For any level of heritage claimed, cost information about the referenced sources of heritage will be required in the section on cost-estimating methodology.

A preliminary description of the instrument design with a block diagram showing the instrument systems and their interfaces must be included. Since the interfaces are not finalized, proposers must identify possible locations for the electrical, mechanical, and data interfaces based on information provided in [*NIRCam Interface Requirements Document*](#) in the AO Library. In addition, the preferred location of the instrument within the ISIM must also be described. Where more than one choice is available, proposers must identify and justify their preference. Proposals must include a discussion of the purpose of the instrument, data rates (peak and average), fields of view, resolution, sensitivity, pointing accuracy, etc. Instrument testing and calibration (both pre- and during flight) must also be described.

- b. Mission. The observing strategy, within the framework of the expected Observatory performance (see [*NGST Level 2 Requirements Document*](#) in the AO Library), required for obtaining the necessary data with the proposed instrumentation must be described. Operational constraints and viewing and pointing requirements must be identified. The concept and the expected requirements for supporting mission operations must be given. Requirements for pre- or postlaunch ground operations support must be identified. Proposers with additional mission operations support beyond what is currently planned by the STScI must include the cost for the additional support under Phase E in Table B-4.
- c. Data Collection, Analysis, and Archiving. A data reduction and analysis plan, following delivery of the data to the ground, must be included. This plan must include the method and format of the data reduction, data validation, and preliminary analysis. Successful PI's will work with the STScI during the NIRCam Phase A Concept Study to refine the process by which data will be prepared for archiving, including a list of the specific data products and the individual team members responsible for the data products. Delivery of the data

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to the data archive must be consistent with the [NGST Level 2 Project Requirements](#) (See AO Library Document).

- d. Science Team. This section must identify the investigation science team. It is required that every Co-I's role and responsibilities be explicitly given in the proposal. NASA strongly encourages proposers to identify only the most critically important personnel to aid in the execution of their proposals. The roles and responsibilities of any other science team member funded for the investigation (defined as meaning anytime in Phases A-D) must also be explicitly defined and the capabilities and experience of all Co-I's and funded science team members must be described. The names of all Co-I's and funded science team members must appear on the Cover Page and Investigation Summary.
- ii. Proposals other than NIRCам PI proposals
 - a. Instrument Calibration and Commissioning (MIRI Science Lead proposals only)

MIRI Science Lead investigations must describe the proposed approach for developing algorithms for instrument operation, analysis tools and documentation, and describe MIRI calibration and commissioning plans.
 - b. Mission

The observing strategy, within the framework of the expected Observatory performance (see [NGST Level 2 Requirements Document](#) in the AO Library), required for obtaining the necessary data with the reference instrumentation must be described. Viewing and pointing requirements must be identified.
 - c. Data Collection, Analysis, and Archiving

A data analysis plan, following delivery of data to the ground must be included.
 - d. Science Team (MIRI Science Lead peroposals only). This section must identify the roles and responsibilities for the MIRI Science Team relative to the NASA Center designated as the technical lead center for the MIRI. The proposal should discuss how the MIRI Science Lead and his/her team will work with the NASA Center and ESA to ensure proper science input is provided during all phases of MIRI science and development.

E. CURRENT AND PENDING SUPPORT (ALL INVESTIGATION CLASSES)

Information must be provided for all ongoing and pending projects and proposals that involve the proposing PI, Co-I's, and funded science team members.

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Therefore, for each of the two categories of support awards as may exist at the time of the proposal submission deadline, namely,

- a) Current Support (for any of the period that overlaps with the proposal being submitted to this AO) and
- b) Pending Support (including the proposal to this AO),

the proposal must provide the following information for each such individual:

- Title of award or project;
- Program name (if appropriate) and sponsoring agency or institution (including point of contact);
- Proposed period of performance and budget; and
- Commitment by PI, Co-I, or funded science team member in fractions of a full time Work Year (WY).

F. EDUCATION, OUTREACH, TECHNOLOGY, AND SMALL DISADVANTAGED BUSINESS/MINORITY INSTITUTION PLAN

The proposer must provide a statement that she/he understands NASA OSS requirements for Education and Public Outreach (E/PO) and is committed to carrying out an E/PO program that meets the goals described in Section 3.9. For NIRCam PI proposals, the proposer must also provide a brief overview of the planned E/PO activities and their relationship to the proposed mission. This overview should include a brief discussion of any unique characteristics of the mission that might provide unusual opportunities for E/PO. Detailed plans for implementing the E/PO activities, including identification of and formal commitment from E/PO partner institutions, will be part of the NIRCam Phase A concept studies and will be evaluated as part of the down selection process.

NIRCam PI proposers must provide a statement that she/he understands NASA OSS requirements for participation of Small Disadvantaged Businesses and Minority Institutions and intends to comply with these requirements. Details of the plans for addressing these requirements will be part of the NIRCam Phase A concept studies and will be evaluated as part of the down selection process.

G. MANAGEMENT AND SCHEDULE (NIRCam PI and MIRI Science Lead Proposals only)

For NIRCam investigations this section must briefly summarize the proposed management approach. The management organization and decision-making process must be described and the teaming arrangement (as known) must be discussed. The responsibilities of team members, including contributors, and institutional commitments must be discussed. Unique capabilities that each team member organization brings to the team, as well as previous experience with similar systems and equipment, must be addressed. The specific roles and responsibilities of the Principal Investigator, Co-Investigators, and Project Manager must

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be discussed. The relationship between the PI, his/her team, the instrument provider(s) (if not the PI), and NASA must be outlined. Risk management and risk mitigation plans, including possible descope options with cost-savings indicated, particularly for the Canadian components of NIRCam proposals, must be described.

A Project schedule to meet the proposed launch date and covering all phases of the investigation must be provided. The schedule must include proposed major Project review dates, instrument development and delivery, instrument to spacecraft integration and test, any special launch vehicle integration issues, and mission operations and data analysis. Schedule reserve must be clearly identified.

For MIRI Science Lead proposals this section must briefly summarize a proposed management approach for organizing the MIRI Science Team. The management organization and decision-making process must be described. The relationship between the MIRI Science Team and the NASA Center responsible for final integration and test of the MIRI should be discussed.

H. COST ESTIMATING METHODOLOGY AND COSTS

The Cost Plan for all classes of investigations must provide an estimate of the total lifecycle cost to NASA of the investigation, along with sufficient technical information to allow the reliability of the figures to be judged. The assumptions on which the estimate is based must be stated, particularly with regard to any requested Government-furnished equipment and services. For purposes of this cost estimate, the proposer should assume delivery of any hardware in accordance with the Project Schedule shown in Table 3-2. Proposal cost estimates must include clearly identified and sufficient reserves of both schedule and financial resources to ensure on-time delivery.

NIRCam Proposal Additional Instructions

The Cost Plan must have two parts: a detailed total cost for the concept study (Phase A) that is expected to last for 6 months and an estimated cost plan for Phases B, C, D, and E. Firm, fixed-price Phase A contracts with a bridge option will be issued for the concept study while, in the meantime, the contract for Phase B through E is negotiated. Proposers must estimate the NASA Cost in the proposal and, if selected through this AO, in much more detail in the concept study report. In addition the Cost Plan must have a detailed breakdown of the CSA funded elements of the instrument.

Because the interfaces between the instruments and the ISIM have not been finalized, proposers are asked to break down the estimates to a level that allows the total costs associated with major subsystems of the hardware to be identified. Since cost details are not anticipated until the conclusion of the concept study, cost estimates in the proposal

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may be generated with models or cost estimating relationships from analogous investigations.

An investigation may be descoped to meet cost constraints; therefore, the proposer shall identify a prioritized risk management plan for the removal of science objectives, reduction of testing, etc. The decision points for achieving effective reductions in cost and schedule must be identified. The hardware and Project costs associated with the investigation at each level of descoping must be estimated and any resulting schedule savings must be outlined.

The proposer shall also identify a descope plan that provides for a US-only NIRCcam in the event that the CSA contributions are not obtainable for any reason.

This section shall include a first-order estimated cost of the investigation that encompasses all proposed activities, including Phase A/B/C/D/E, fee, and contributions. Costs shall be consistent with the program requirements described in Section 1.4 of the AO. The amount to be costed in each fiscal year must be identified by providing the data in Table B-4, which will not be counted against the page limit, using at least the WBS elements identified in Table B-5 and any other items unique to the proposal. The top portion of Table B-4 requests cost data relative to the NASA Cost. The lower portion addresses both domestic and non-U.S. contributions. Table B-6 gives the NASA inflation index to be used to calculate real-year dollars.

The methodology used to estimate the cost, for example, engineering estimate, specific cost model, past performance, and cost estimating relationships from analogous missions, must be discussed. If an estimate is based on heritage, the performance and cost parameters that the proposed system has in common with the previous system shall be provided. No matter which estimation method is used, sufficient details must be provided in this section and in the technical description of the instrument(s) to allow reviewers to verify the estimate. Budget reserve strategy, including budget reserve levels as a function of mission phase, must be discussed.

Definitions:

| |
|---|
| <p><u>Contingency</u> (or <u>reserve</u>) when added to a resource, results in the maximum expected value for that resource. Percent contingency is the proposed value of the contingency divided by the value of the resource less the contingency.</p> |
| <p><u>Margin</u> is the difference between the maximum possible value of a resource as given in this AO (the physical limit or the agreed-to limit) and the maximum proposed value for a resource. Percent margin for a resource is the available margin divided by its maximum proposed value.</p> |
| <p><u>Example:</u> A payload in the design phase has an estimated mass of 115 kg including a proposed mass reserve of 15 kg. There is no other payload on the ELV and the ELV provider plans to allot to you the full capability of the</p> |

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vehicle, if needed. The ELV capability is 200 kg. The mass reserve is $15/100 = 15\%$ and the mass margin is 85 kg or $85/115 = 74\%$.

Example: The end-of-mission life capability of a spacecraft power system is 200 watts. Your instrument is expected to use 50 watts, including 25% contingency. You are allotted 75 watts by the satellite provider. Your reserve is 10 watts and your margin is 25 watts, or $25/50 = 50\%$.

1. Full Cost Accounting

NASA civil service labor and supporting NASA Center infrastructure must be costed on a full cost accounting basis. If NASA guidance for full cost accounting has not been fully developed by the closing date for proposal submission or for completion of the definition studies, NASA Centers may submit full cost proposals based on the instructions in the NASA Financial Management Manual, Section 9091-5, "Cost Principles for Reimbursable Agreements," or based on their own Center-approved full cost accounting models. Other Federal Government elements of proposals must follow their agency cost accounting standards for full cost. If no standards are in effect, the proposers must then follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board.

2. Goods and/or Services Offered on a No Exchange of Funds Basis

Contributions of any kind, whether cash or noncash (property and services), to NGST investigations by organizations other than the NASA Office of Space Science are welcome. Such contributions must not increase NASA's cost or risk during any mission phase. The value of the contributed goods and or services must be entered in the lower part of Table B-4. Values for all contributions of property and services shall be established in accordance with applicable cost principles. Such contributions may be applied to any part or parts of the NGST mission. A letter of endorsement that contains a statement of financial commitment from each responsible organization offering to make a contribution to the investigation must be submitted with the proposals for all U.S. components.

I. APPENDICES

The following additional information is required to be supplied with the proposal. This information can be included as Appendices to the proposal, and, as such, will not be counted within the specified page limit. NO OTHER APPENDICES ARE PERMITTED.

1. Resumes. Provide resumes or *Curriculum Vitae* for the PI, Co-I's, and funded science team members identified in the science section and named on the Cover Page and Investigation Summary. Resumes or *Curriculum Vitae* must be no longer than

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two pages in length for the PI and one page for all other investigators. The *Curriculum Vitae* should include his/her professional experiences, positions, and a bibliography of publications relevant to the proposal. Letters from Co-I's should also state their role in the proposed investigation.

2. Letters of Endorsement. Letters of endorsement must be provided from all organizations offering to supply goods or services or make a contribution to the investigation. Letters of endorsement must be signed by both the lead representative from each organization represented on the team, and by institutional or Government officials authorized to commit their organizations to participation in the proposed investigation. In the case of science investigators who are providing their time, but not hardware/software or other tangible items, a letter from that investigator only will suffice. Copies of faxed or E-mailed letters from non-U.S. participants may be substituted in the hard copy proposals submitted by the deadline as long as signed letters are received by the date specified in the schedule provided in Section 6.0 in this AO.

Statement(s) of Commitment from Co-I's and/or Funded Science Team Member

Every Co-I and funded science team member from a U.S. as well as a non-U.S. institution identified in the proposal must submit a brief, signed statement of commitment that acknowledges his/her participation, even if they are from the PI's own institution. In the case of more than one Co-I and/or funded science team member from a given institution, a single, multiply signed statement is acceptable. Each statement should be addressed to the PI, may be a facsimile, and must contain the following, or approximately similar, language:

"I(we) acknowledge that I(we) am(are) identified by name as Co-Investigator(s) [or funded science team member(s)] to the investigation entitled <name of proposal> that is submitted by <name of Principal Investigator> to the <name of Announcement> NASA Announcement of Opportunity, and that I(we) intend to carry out all responsibilities identified for me(us) in this proposal. I(we) understand that the extent and justification of my(our) participation as stated in this proposal will be evaluated during peer review in determining the merits of this proposal."

3. NASA Principal Investigator Proposing Teams: Proposals submitted by NASA employees as Principal Investigators must contain the following information concerning the process by which non-Government participants were included in the proposal. The proposal must (i) indicate that the supplies or services of the proposed non-Government participant(s) are available under an existing NASA contract; (ii) make it clear that the capabilities, products, or services of these participant(s) are sufficiently unique to justify a sole source acquisition; or (iii) describe the open process that was used for selecting proposed team members. While a formal solicitation is not required, the process cited in (iii) above must include at

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least the following competitive aspects: notice of the opportunity to participate to potential sources; submissions from and/or discussions with potential sources; and objective criteria for selecting team members among interested sources. The proposal must address how the selection of the proposed team members followed the objective criteria and is reasonable from both a technical and cost standpoint. The proposal must also include a representation that the Principal Investigator has examined his/her financial interests in or concerning the proposed team members and has determined that no personal conflict of interest exists. The proposal must provide a certification by a NASA official superior to the Principal Investigator verifying the process for selecting contractors as proposed team members, including the absence of conflicts of interest.

4. References List: Proposals may provide a list of reference documents and materials cited in the proposal. The documents and materials themselves cannot be submitted except as a part of the proposal (*i.e.*, within the page limits).
5. Acronym List: Proposals may provide a list of acronyms used within the proposal. The list may not be submitted except as a part of the proposal (*i.e.*, within the page limits).
6. Statement of Work (SOW). For investigations managed from non-Government institutions, provide a SOW for all potential contracts with NASA. For investigations managed from Government institutions, provide a SOW as if the institution were non-Government. This SOW must include the requirement for a concept study report. In addition, the SOW must include general task statements for Phases B/C/D, and for Phase E for the investigation. All SOW's must include the following as a minimum: Scope of Work, Deliverables (including science data), and Government Responsibilities (as applicable). SOW's need not be more than a few pages in length.
7. Draft International Agreement(s) (NIRCam PI and MIRI Science Lead proposals only) Draft International Agreement(s) are required for all non-U.S. partners in the investigation.
8. Model Phase A Study Contract (NIRCam PI proposals only) Proposers should fill out and return the model contract from the AO Library. NASA will negotiate with the PI for TBD items and items proposed by the PI.

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Table B-4. Total Investigation Cost Funding Profile Template
(FY costs in 2002 Dollars, Totals in FY 2002 (FY02\$) and Real-Year Dollars (RY\$))

| Item | FY03 | FY04 | FY05 | FY06 | FY07 | FY08 | FY09 | FY10 | Total (FY02\$) | Total (RY\$) |
|------------------------|------|------|------|------|------|------|------|------|-------------------|-----------------|
| NASA Cost | | | | | | | | | | |
| Concept Study | | | | | | | | | | |
| Phase B/C/D: | | | | | | | | | | |
| WBS 1.0 | | | | | | | | | | |
| 1.1-1.n | | | | | | | | | | |
| WBS 2.0 | | | | | | | | | | |
| 2.1-2.n | | | | | | | | | | |
| WBS 3.0 | | | | | | | | | | |
| WBS 4.0 | | | | | | | | | | |
| WBS n.0 | | | | | | | | | | |
| Phase E*: | | | | | | | | | | |
| WBS 1.2 | | | | | | | | | | |
| MO & DA | | | | | | | | | | |
| E/PO** | | | | | | | | | | |
| Total NASA Cost | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Contributions: | | | | | | | | | | |
| WBS 1.0 | | | | | | | | | | |
| . | | | | | | | | | | |
| . | | | | | | | | | | |
| . | | | | | | | | | | |
| WBS n.0 | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Total Contributions | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| | | | | | | | | | Total Cost | \$ |

Costs must include all costs including overhead, G&A, and fee. Instrument costs must include the costs of two identical instruments and any spares.

** Education and/or Public Outreach. This budget line must also be included with the electronically submitted version of the E/PO plan (see section D of Appendix B).

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Table B-5. WBS Elements

| | |
|-----|---|
| 1.0 | Management/Science support (including Co-Investigators) must include: <ul style="list-style-type: none">• Contract Management• Project Planning and Control• Performance/Quality Assurance |
| 2.0 | Instrument costs including: <ul style="list-style-type: none">• optics• mechanisms• power distribution• structure• electronics• other major assemblies• integration/assembly/test |
| 3.0 | Software development/data processing |
| 4.0 | Special ground data system costs if applicable |

Table B-6. NASA Inflation Index

| Fiscal Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Inflation Rate | | 3.1% | 3.4% | 3.3% | 3.3% | 3.3% | 3.3% | 3.3% | 3.3% | 3.3% |
| Cumulative Inflation Index | 1.000 | 1.031 | 1.066 | 1.101 | 1.138 | 1.175 | 1.214 | 1.254 | 1.295 | 1.338 |

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APPENDIX C

NGST AO Library

NGST AO Information Homepage <http://www.ngst.nasa.gov/cgi-bin/doc?Id=871>

| Document Title | URL |
|---|---|
| <i>Astronomy and Astrophysics in the New Millennium</i> | http://www.nap.edu/books/0309070317/html/ |
| Canadian Capabilities Reports | http://www.ngst.nasa.gov/cgi-bin/doc?Id=918 |
| Cost Estimating Relationships and Guidelines | http://www.ngst.nasa.gov/cgi-bin/doc?Id=909 |
| Guidelines and Criteria for NIRCam Phase A Study Report Preparation | http://www.ngst.nasa.gov/cgi-bin/doc?Id=921 |
| Instrument Deliverable Documents List | http://www.ngst.nasa.gov/cgi-bin/doc?Id=899 |
| ISIM Provided Services | http://www.ngst.nasa.gov/cgi-bin/doc?Id=898 |
| MISC MIRI Recommendations | http://www.ngst.nasa.gov/cgi-bin/doc?Id=920 |
| <i>Next Generation Space Telescope Report</i> | http://www.ngst.nasa.gov/cgi-bin/doc?Id=325 |
| NGST Instrument Development Team and Science and Operations Center Roles and Responsibilities | http://www.ngst.nasa.gov/cgi-bin/doc?Id=919 |
| NGST Level 2 Requirement | http://procurement.nasa.gov/cgi-bin/EPS/synopsis.cgi?acqid=97125 |
| NGST Program Organization Chart | http://www.ngst.nasa.gov/cgi-bin/doc?Id=442 |
| NGST Science Instrument Recommendations | http://www.ngst.nasa.gov/cgi-bin/doc?Id=549 |
| NGST Technology Readiness Levels | http://www.ngst.nasa.gov/cgi-bin/doc?Id=852 |
| NIRCam Interface Requirements Document | http://www.ngst.nasa.gov/cgi-bin/doc?Id=866 |
| NIRCam Phase A Model Contract | http://www.ngst.nasa.gov/cgi-bin/doc?Id=927 |
| <i>Roadmap for the Office of Space Science Origins Theme</i> | http://origins.jpl.nasa.gov/library/scienceplan00/index.html |
| Scientific Objectives and Capabilities of NGST | http://www.ngst.nasa.gov/cgi-bin/doc?Id=869 |
| SWG Charter | http://www.ngst.nasa.gov/cgi-bin/doc?Id=867 |
| Technology Development Specifications for NGST Detectors | http://www.ngst.nasa.gov/cgi-bin/doc?Id=641 |
| <i>The Space Science Enterprise Strategic Plan</i> | http://spacescience.nasa.gov/strategy/2000/index.html |

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APPENDIX D

Certifications

The following pages contain, for reference only, copies of the three currently required Certifications. Note that the signature of the Authorizing Institutional Representative on the printed copy of the Cover Page submitted with the proposal now verifies that the proposing organization complies with these Certifications; therefore, these Certifications do not have to be independently signed and submitted as in previous Announcements of Opportunity.

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Certification Regarding Debarment, Suspension, and Other Responsibility Matters

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 34 CFR Part 85, Section 85.510, Participant's responsibilities. The regulations were published as Part VII of the May 26, 1988 Federal Register (pages 19160-19211).

- (1) The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
 - (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
 - (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
 - (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
 - (d) Have not within three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.
- (2) Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

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Certification Regarding Lobbying

- (1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- (2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
- (3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000, and not more than \$100,000 for each such failure.

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Certification of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs

The (*Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant "*) hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1962 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognized and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorized to sign on behalf of the Applicant.

NASA Form 1206